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Computer Inservice for Teachers: The Medicine Hat Consortium

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Devonian Building, West Tower, 11160 Jasper Avenue, Edmonton, Alberta, Canada T5K 0L2

October 1984

To the Reader,

Re: Medicine Hat Computer Consortium

The evaluation report for the teacher inservice project conducted by a consortium of school systems in the Medicine Hat area of Alberta is enclosed. The conclusions and recommendations will be of interest to school systems and agencies planning inservice programs for teachers on microcomputer technology topics.

Sincerely,

H.I. Hastings

H. I. Hastings
Director
Planning Services Branch

COMPUTER INSERVICE FOR TEACHERS:

THE MEDICINE HAT CONSORTIUM

Evaluation Report

by

Dr. Louise Zdunich

Prepared for
The Medicine Hat Computer Consortium

Under contract to
ALBERTA EDUCATION

OCTOBER, 1984

ACKNOWLEDGMENTS

Special thanks are due to many people for without their assistance and co-operation the completion of this research study would not have been possible:

The Steering Committee of The Medicine Hat Computer Consortium Research Project: Chairman Mr. Bob Carter, Medicine Hat School Division No. 4; Mr. Lorne Cooper, Medicine Hat School District No. 76 (from September, 1983); Dr. Al Anderson, Medicine Hat School District No. 76 (to September, 1983); Mrs. V. Swan, Medicine Hat Catholic Board of Education No. 21; Dr. Larry Wingert, Medicine Hat Catholic Board of Education No. 21; and Mr. Cam Barbour, Medicine Hat School Division No. 4 for their many hours of work to make the project a success.

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SUMMARY

The Medicine Hat and District Computer Consortium teacher inservice courses held in 1982-83 and 1983-84 produced positive changes in teachers' attitudes towards computers, as well as gains in functional knowledge and computer literacy. There was little or no change in teachers' priorities for computer use, program expansion, perceived usefulness of various types of programs, importance of computer applications and budgeting. Not all of the small number of teachers involved in this study who were teaching Alberta Education computer literacy units to students found the inservice useful for that purpose. This may reflect the fact that the inservice courses were not geared specifically to these curricula.

Teachers believed that about six hours of instruction was sufficient to obtain functional knowledge of computers while about 30 hours was needed to acquire computer literacy. Teachers suggested that class sessions should not be longer than three hours. They recommended that the ratio of teachers to instructor should not be greater than 10 or 15 to one. In addition, teachers felt there should be a computer for every one or two learners.

Because of the high drop out rate in some of the general courses offered in the first year of the project, researchers recommended short orientation microcomputer courses for interested teachers to permit them to gain general knowledge prior to their decision whether or not they wished to enroll in longer and more

in-depth courses. Further recommendations of this study include the following:

1. that inservice courses continue to be offered to Alberta teachers.
2. that districts establish long-range plans for applications of computer technology in schools and inservice directly geared to these needs.
3. that consortia of small school systems be considered to plan and coordinate inservice efforts.
4. that needs of teachers be assessed before courses are initiated.
5. that instructors be hired, if at all possible, who are viewed as resident computer experts within schools, are actively teaching computer classes for students and are reputed to be effective teachers in general.
6. that instructors be provided with guidelines and expectations for the courses they will teach.
7. that, based on these guidelines, instructors develop a specific course outline to be approved by a systems coordinator or consortium steering committee and made available to teachers before course registration.
8. that as a first step in staff inservice, at least one person in each school be trained in computer literacy in order to have on-site resource personnel for others taking inservice courses.
9. that a first level, six hours course of instruction be

provided for interested teachers to enable them to acquire a functional understanding of microcomputers and to prepare them to utilize CAI in the classroom.

10. that computer literacy (functional knowledge plus programming) courses be scheduled for 20-30 hours, depending on background of participants, specifically for those involved in teaching Alberta Education' computer literacy curricula to students.
11. that courses be scheduled at appropriate times to enable teachers to participate.
12. that curriculum taught in inservice classes consist of information which will be needed by teachers in schools.
13. that ratio of teachers to instructor not exceed 10:1 or 15:1.
14. that ratio of teachers to microcomputers in inservice sessions not exceed 2:1 (more people indicated 2:1 as more appropriate than 1:1).
15. that the duration of class sessions be no longer than three hours.
16. that some provision be made to accomodate individual differences while teaching continues in small groups.
17. that microcomputers be made available in each school and/or on a loan basis to teachers to provide easy access for computer practice.

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INTRODUCTION

Purpose of the Study

Current thrusts of computer technology in the world of work, leisure, education and more recently, by government in education indicate that we will be increasingly involved with computers in the field of learning. This is exemplified by Leverett (1978):

> The standard justification for including computer education in a school's curriculum is based on the pervasive and intrinsic nature of computer activity within our society. "Pervasive" because some element of computer activity will frequently "touch" every member of our society during their lifetime; "intrinsic" because computers are fundamental to the functioning of a modern industrial society. It is argued, therefore, that every member of society should have an appreciation of the nature and use of computers.
>
> It is increasingly evident that the current need for computer education is unlikely to fade but will become more established. Unlike the situation for previous technologies a high proportion of ordinary citizens are becoming involved in computer technology both from a learning and utilization standpoint.

Students today who are engaging in the work force or moving to higher education are at a distinct advantage if they are versed in the technology of computers.

School programs on computers are, however, being hampered by virtually every aspect of adjusting to the new revolution. Pressure for computers within schools has not resulted in clear directions for preparation of teachers and students. Definitions, policies and programs on literacy are currently in the development stage and there exists varying degrees of confusion. Simultaneously, untried curricula are being tested, choices of hardware with concerns for the latest are being made and professional staffs are attempting to "get with it". Financing is an overriding concern for computer technology is expensive.

Schools, however, are attempting to deal with the obvious needs of their students. Teacher orientation and inservice are of immediate concern to school jurisdictions. Costs of equipment and teacher orientation will be major budgetary items for the forseeable future.

A review of research literature (See Appendix A for this review by A.L. Anderson) revealed efforts during recent years to delineate aspects of computer knowledge and skills needed by teachers and students. In addition, numerous methods of rendering teachers computer "literate" are unfolding throughout Canada and the United States by educators who, of necessity, are at the cutting edge of computer education and classroom applications.

Teacher training models generally fall into two categories: an awareness level and a functional level. Martin (1982) recommended several means for attaining these levels in school systems: providing inservice through teacher meetings, professional days, resource staff as well as resource centres and a resource teacher in each school.

One thing is clear as Metzcus (1983) stated in a conference address: "There are no shortcuts to functional computer literacy. For all concerned there is a price to pay and the price is time, effort and more of the same."

With the announcement by the Minister of Education indicating the emphasis to be given to computers in education and computer literacy specifically, concern was expressed by all jurisdictions within the Medicine Hat area regarding the direction to be taken. Exploratory meetings were held with participants from the Medicine Hat School District, the Medicine Hat School Division, the Medicine Hat Catholic Board of Education and the regional college to determine the feasibility of cooperating in areas of mutual concern. As a result of series of meetings, the groundwork of the Medicine Hat and District Computer Consortium was established to include educators from these jurisdictions as well as Redcliff and Ralston School Districts.

It was primarily the interest and action of teachers and administrators, as well as the support of school boards in the Medicine Hat Region that was responsible for the formation of a cooperative body to facilitate professional development in the area. In the spring of 1982 a research proposal that addressed their concerns was forwarded to Alberta Education for review with the intent that a study be undertaken on alternate methods of orienting teachers to computers. The newly formed Consortium was to be the researching group.

A steering committee comprised of representatives from various interest groups was established by the Planning Services Branch of Alberta Education. This five-member committee included representatives from teachers, all school boards involved and Alberta Education. Their duties included monitoring the progress of the study, providing assistance and advice in implementation as well as making judgments concerning the validity of the findings, conclusions and recommendations.

From February to June, 1982 a pilot study for 140 teachers and other school personnel was conducted. Seven classes of 20 teachers who had been involved were given a self-reporting questionnaire. The purpose of the pilot study (See Appendix B for report by B. Carter) was to gather information relevant to some of the research questions to be used in the main study.

Statement of the Problem

The area of concern was teacher preparation in the field of computers. The basic question asked was: Can a consortium of school boards provide effective computer inservice for teachers? The specific research questions which guided the study and the source of the data are set forth in the following chart.

QUESTIONS	DATA SOURCE
What are the background characteristics of teachers who take microcomputer courses?	1982 Pretest: Items 1-5 1984 Follow-up: Items IV, V
Why do teachers take inservice courses?	1984 Follow-up: Item XIV
Why do teachers drop out of inservice courses?	1984 Follow-up: Item XIII
Do teachers attitudes about microcomputers change as a result of inservice courses?	1984 Follow-up: Item XV
What is the relative effectiveness of this project in changing attitudes compared to a university credit course?	1984 Follow-up: Item XV

QUESTIONS	DATA SOURCE
To what extent can teachers learn how to to identify the meaning of terms for microcomputer parts and functions?	1983 Pre & Posttest Part II: Items 1-5
Can teachers achieve a mastery level of basic computer literacy with a minimum of 21 hours of instruction?	1982 Pre & Posttest Part III: Items 1-3,6-17,19
Can teachers achieve a working knowledge of: Basic; Advanced Basic; Logo; Utility Programs (Data Base, Spread Sheet, Word Processing) in 12 hours of instruction ?	1983 Pre & Posttest Part III: Items 1-15
Do teachers increase their awareness about how microcomputers can be used in the classroom?	1982 Pretest Part I: Items 7-8 1983 Posttest: Part I: Item 4-5
Following inservice courses, do teachers change their priorities regarding educational applications for microcomputers and for particular types of classroom applications?	1982 Pre & Posttest Part II: Item 3, 4, 6
How well did the microcomputer courses prepare teachers to teach students?	1984 Follow-up: Items XVI-XVII
What funding priorities should apply to school programs and to computer needs?	1982 Pre & Posttest Part II: Item 1-2
What inservice conditions are recommended by teachers who have experienced one or more of the microcomputer courses?	1984 Follow-up: Items VI-XII

Definition of Terms

End results in the areas of skills and knowledge were defined as follows:

1. **Functional knowledge** of computers included knowledge of computer parts (disk drive, monitor, central processing unit), how to initialize and copy disks, how to run existing programs,

and how to use simple keyboard commands such as RETURN, LOAD, SAVE, CATALOG, LIST AND REPEAT.

2. **Computer literacy** included a working knowledge of the skills contained in functional knowledge of computers plus how to write programs in either BASIC or LOGO.

Categories of computer applications were defined in the study as follows:

1. **Computer Enhanced Learning**, a general open-ended problem-solving technique enhances the presentation of a concept through games, challenges, simulations and demonstrations.

2. **Computer Language Systems** includes the operation of the computer and programming in BASIC or LOGO.

3. **Computer Assisted Instruction** (CAI) involves programs that teach specific ideas in a subject area as students interact in a direct manner with the computer. It may include practice, drill and tutorials and can be used for basic instruction, review or enrichment. Students have control of the pace of instruction.

4. **Administrative Programs** are utilized to keep track of or facilitate administrative tasks such as time tabling, record keeping, budget control.

5. **Computer Managed Instruction** is utilized for achievement monitoring, testing and tracking at the classroom level in order to determine the next step in programming. Teachers (not students, as in CAI) typically interact with the

computer and control the process.

Limitations and Delimitations of the Study

This study was delimited to small samples of teachers who volunteered for inservice and who were not necessarily representative of teachers in general. In addition, the sample sizes were further reduced by withdrawal of teachers from courses for which they had enrolled, as well as from the failure to ensure that all participants had responded to both pre-and posttests. Therefore, it cannot be known if non-respondents were any different from those who responded.

Some of the data collected was of the "self-report of personal perceptions" variety. For this type of information, attitudes and opinions were measured, not behaviors or skills. Therefore, the views expressed may not be totally congruent with actual teaching behaviors and classroom practices.

METHOD

Subjects and Program Groups

Courses were provided for Medicine Hat area teachers for three hours one evening a week for seven weeks during the school year in 1982-83. During 1983-84, class sessions were of two hour durations and were given for six weeks. Therefore, in the first year, courses consisted of 21 hours and in the second 12 hours of instruction. Utilizing various computer languages, each course attempted to help students achieve functional knowledge of computers plus computer literacy.

The size of instructional groups was generally smaller than the size of class groups. Participant-computer ratio was either 2:1 or 1:1 for each group. Copies of course outlines which were followed for inservice programs may be found in Appendix C.

All teachers in the Medicine Hat area were eligible for courses given throughout the two year period. Subjects for the study were only those who responded to both pre-and posttest questionnaires. Teachers who had participated only in the pilot study courses in early 1982 were not included. In most cases, there were more teachers who completed courses than there were respondents for both sets of questionnaires. It is evident from the data in Tables 1 and 2 that nearly one-half of the students abandoned courses without completing them.

In this section, each group is identified according to the computer language utilized. Tables display data on numbers of teachers for whom only pretest data is available and who, therefore, dropped out of courses. The second set of numbers represents those for whom only posttest data was available. This group completed courses but as pretest data was not available they were excluded from the study. Those who completed both pre-and posttests were the subjects for the study.

In the **1982-83 year** programs consisted of introductory computer courses and were categorized as follows:

Group 1 BASIC was an extension course in computer literacy utilizing BASIC from the University of Calgary given to Medicine Hat teachers.

Group 2 LOGO utilized instructions in the use of LOGO computer language consisted mostly of teachers from Medicine Hat School District #76. This course was taught by the same instructor as Group 5.

Group 3 BASIC consisted of instruction in BASIC computer language. This course was essentially the same as that for Group 4 although given by a different instructor.

Group 4 BASIC comprised instruction in BASIC computer language using the Medicine Hat College curriculum and was offered in the evening.

Group 5 LOGO, mostly Medicine Hat Catholic School District #21 teachers, were taught LOGO computer language. This class was given in the evening.

Table 1

Number of Teachers: 1982-83

Groups	Pretest Only	Posttest Only	Pretest & Posttest
1	8	3	14
2	4	0	13
3	9	0	27
4	26	4	7
5	40	3	19
Total	87	10	80

Note. Teachers in the first column registered but dropped out of courses; in the second column, although pretests were missed, teachers completed courses; the last column represents teachers who completed courses and were subjects for the study.

In the **1983-84 year** courses taught were categorized as follows:

Group 1 BASIC consisted of an introduction to the use of microcomputer and to the BASIC computer language.

Group 2 ADVANCED BASIC was an extension of participants' working knowledge of BASIC, including sufficient command of the language to develop programs for classroom use.

Group 3 Utility Programs was a course which included Data Base (managing data in schools such as filing, retrieving and sorting of information); Word Processing (writing, editing and formatting documents); and Spread Sheets (Visicalc for budgeting and other mathematical uses).

Group 4 LOGO was aimed at aiding teachers in creating a problem solving environment in the elementary classroom using the LOGO language as a classroom tool and as a curriculum aid.

Table 2

Numbers of Teachers: 1983-84

Groups	Pretest Only	Posttest Only	Pretest & Posttest
1	5	2	17
2	1	1	9
3	3	2	11
4	2	0	4
Total	11	5	41

Note. Teachers in the first column registered but dropped out of courses; in the second column, although pretests were missed, teachers completed courses; the last column represents teachers who completed courses and were subjects for the study.

Instruments

Questionnaires completed by teachers included self-reporting of background information, personal perceptions of usefulness and structuring of courses, as well as priority ratings for microcomputers and programs for school use. In addition, teachers were tested on their knowledge of microcomputer functions and programming. See Appendix D for copies of all instruments.

1982-83 Study

Part I: Background Information. This section of the instrument covered present administrative and/or teaching responsibility according to grade level and subject area. Teaching and/or administrative experience as well computer orientation and experience were also queried. In addition teachers were asked to list possible uses of computers in their present work and limitations or problems for computer use in schools.

Part II: Opinionnaire. Priority ratings were given for budgeting for various subject areas, including computer technology, as well as the various areas of computer use. Teachers were asked to rate uses they could make of a computer in their classrooms, usefulness of various types of computer programs and uses of computers in various subject areas.

Part III: Computer Literacy. This portion comprised 19 multiple choice items of knowledge of computer commands. In addition, teachers rated areas of computer technology according to the concentration which they believed should be placed by Alberta Education in the near future.

1983-84 Study

Part I: Background Information. Years of teaching experience, experience with microcomputers and attitudes towards microcomputers were recorded in this section.

Part II: Computer Functional. A five-item knowledge of general microcomputer functions was tested in this portion.

Part III: Computer Literacy. This section provided a test of knowledge of: Basic, Advanced Basic, Logo and utility programs (Data Base, Spread Sheet, Word Processing).

1984 Follow-up Survey

This survey questionnaire was given to all those who took classes either or both of the two years of the study, but not to those who had only participated in the pilot study. Included in this survey were:

1. general areas of background information: which set of classes were taken, teachers' school jurisdiction, teaching experience, and microcomputer experience prior to taking courses;

2. teachers' motivation for enrolling in and reasons for abandoning courses, as well as their attitude towards computers before and after taking courses; and

3. teachers' acquisition of knowledge and skills in the use of computers, that is functional knowledge and computer literacy.

4. participants' perceptions of the usefulness of inservice programs in equipping teachers to provide adequate instruction to students in the Alberta Education curricula units on computer literacy.

5. teachers' recommendations regarding suitable methods and organization for effective computer inservice for teachers.

Data Collection

Questionnaires were administered during class time before and after each course. In addition, the Follow-up Survey was administered at the end of the study, that is, in 1984. These questionnaires were sent to the schools where the course participants of either the 1982-83 or the 1983-84 year were teaching at the time. The return rate of the Follow-up Survey, particularly for teachers who had not completed courses was low.

Procedure

The complete study encompassed two school years. It began in September, 1982 and was completed in June, 1984. The time line presented on the following pages depicts the activities with the periods of time in which they were carried out, as well as the person or group responsibe for each activity.

Statistical Procedures

Percentages were calculated for background characteristics, motivation and attitude change of teachers. Significance of differences between groups in computer literacy and functional knowledge was found using analysis of variance, followed by Scheffe's pairwise comparisons. Significance of differences in gains in knowledge of the computer language taught for each group was analyzed utilizing t-tests.

Percentages were calculated for teacher perception before and following inservice courses of computer applications, problems with implementation, usefulness of courses and the relative effectiveness of courses for teaching computer literacy units required by the Alberta curriculum. Percentages were also calculated according to participants' recommendations for teacher inservice organization and methods.

Rank order of priorities for computer and program use and expansion were assigned by teachers both before and after inservice programs. Percentages of teachers were calculated for each rank. The degree of agreement between ranks assigned by teachers before and after the inservice course was determined by computing Spearman's Rho (rank order correlation coefficient).

			1982						1983				1984			
CODE	***DESCRIPTOR***	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Sept. Oct.	Nov. Dec.	Jan. Feb.	Mar. Apr.	May	June	***NOTES*** RESPONSIBILITIES
1.0	Appoint steering committee	┌─	─┐														Research Officer and Liaison Committee
2.0	Recruit project coordinator	┌─	─┐														Planning and Research Liaison Committee
3.0	Review the literature		┌─┐														Liaison Committee
4.0	Finalize Orientation Plan	┌─	─┐														Steering Committee
	4.1 Establish Standards of Computer Literacy	┌─	─┐														Steering Committee
	4.2 Develop Performance Indicators		┌─	─┐													Research Coordinator
	4.3 Pilot 4.2 Test using micros validate																Research Coordinator
	4.4 Administer performance tests		┌─	─┐				┌─┐			┌─┐				┌─	─┐	Research Coordinator
	4.5 Analyze and report									┌─┐		┌─┐			┌─	─┐	Research Coordinator Steering Committee
5.0	(Question) Use of Computer																
	5.1 Develop a test questionnaire on knowledge & use of computers	┌─	─┐														Research Coordinator Steering Committee
	5.2 Pilot of 5.1 test	┌─	─┐														Research Coordinator
	5.3 Administer Pretest and Posttest		┌Pr┐		┌Po┐		┌Pr┐		┌Po┐		┌Pr┐	┌Po┐	┌Pr┐	┌Po┐			Research Coordinator
	5.4 Analyze test results					┌─┐				┌─┐					┌─	─┐	Research Coordinator Steering Committee
	5.5. Report test results						┌─┐			┌─┐					┌─	─┐	Research Coordinator Lisaison Committee

LEGEND

START DATE ← END DATE → SCHEDULE DELAY →
← PROGRESS LINE

○ SCHEDULED REVIEW
● COMPLETED REVIEW
⋀ DECISION POINT (See notes)
△ DECISION MADE

ISSUE DATE: Sept. 1,1982
REVISION NUMBER: 3
REVISION DATE: ______
PREPARED BY: A. L. Anderson
PAGE 1 OF 2

CODE	DESCRIPTOR	1982 Sept.	Oct	Nov.	Dec.	Jan.	Feb.	1983 Mar.	Apr.	May	Sept. Oct.	Nov. Dec.	Jan. Feb.	1984 Mar. Apr.	May	June	NOTES
6.0	Attitude Component																
	6.1 Develop intended Attitude List		⊓														Liaison Committee Research Coordinator
	6.2 Develop an Attitude Questionnaire: Pre and Posttest		⊓														Steering Committee Research Coordinator
	6.3 Pilot the Attitude Questionnaire		⊓														Research Coordinator Steering Committee Review Questionnaire
	6.4 Administer the Questionnaire																Liaison Committee
	6.4.1 Pretest		⊓				⊓										Research Coordinator
	6.4.2 Posttest				⊓				⊓								
	6.5 Analyze Questionnaire Results		⊓			⊓		⊓	⊓	⊓							Research Coordinator Steering Committee
	6.6 Report results of Attitude survey									⊓						⊓	Research Coordinator Liaison Committee

LEGEND

START DATE ← END DATE → SCHEDULE DELAY →
← PROGRESS LINE

○ SCHEDULED REVIEW
● COMPLETED REVIEW
⩚ DECISION POINT (See notes)
△ DECISION MADE

ISSUE DATE: Sept. 1, 1982
REVISION NUMBER: 3
REVISION DATE:
PREPARED BY: A. L. Anderson
PAGE 2 OF 2

RESULTS OF THE STUDY

Background Characteristics of Course Participants

What are the background characteristics of teachers who take microcomputer inservice courses?

To determine who had taken part in the first year of computer inservice, the 80 course participants who completed the inservice courses were queried regarding their present school positions and their experience and training. Tables 3 to 7 present information on the 1982-83 inservice participant characteristics.

Over one-half of the participants in microcomputer courses were elementary grade teachers and almost one-half were teaching three or more subjects. A small proportion (15%) of workshop participants were holding administrative responsibilities, and 11% were school principals and vice-principals. Over one-half of those attending courses for both years of the study had more than 10 years teaching experience, while nearly one-third of participants in the 1982-83 inservice year had more than 15 years.

More than one-half of the teachers had no previous orientation to computers. A small percentage of teachers had previous learning experience in computers through courses or conferences while another small group had learned about microcomputers through reading or informal experience.

Table 3

Teaching Responsibilities of Inservice Participants

1982-83 Study

Class Level	Percentage
Elementary	59.0
Junior High	15.4
Senior High	7.7
Both Elementary and Junior High	5.1
Both Junior and Senior High	11.5
Other	1.3

N = 78

Table 4

Principal Subject Area Responsibilities of Inservice Participants: 1982-83 Study

Subject	Percentage
Three or More Subjects	40.0
Mathematics (more than 1/2-time)	5.0
Science	5.0
Social Sciences	1.2
Arts	5.0
Languages	8.7
Other	35.0

N = 80

Table 5

Administrative Responsibilities of Inservice Participants:1982-83 Study

Category	Percentage
None	85.0
Principal	6.3
Vice-Principal	5.0
Department Head	0.0
Central Office	3.7

N = 80

Table 6

Teaching and/or Administrative Experience of Inservice Participants: 1982-83 Study

Years of Experience	Percentage
2 years or less	5.1
2 to 5 years	20.3
6 to 10 years	27.8
11 to 15 years	17.7
More than 15 years	29.1

N = 79

Table 7

Inservice Participants' Previous Orientation to Microcomputers: 1982-83 Study

Level of Orientation	Percentage
None	56.3
One Course	15.0
More Than One Course	1.2
Conference Attendance Only	1.2
Personal Reading/Informal Experience	26.2

N = 80

In the follow-up questionnaire, participants in teacher inservice for either of the 1982-83 or 1983-84 years, were asked regarding their previous teaching and computer experience. Tables 8 and 9 present the percentages of teachers falling into each category.

A similar pattern emerged for participants of the two years as in the first year of the courses alone. There was, however, some indication of a smaller proportion of newer and a larger proportion of more experienced teachers taking courses than had in the first year alone. Previous microcomputer experience was similar with over one-half of the group having none. However, a smaller percentage of all the participants overall gained knowledge through personal reading/experience with a larger proportion having taken courses or conferences when compared with those in the first year of the study.

Table 8

Years of Teaching Experience: 1984 Follow-up

Years	0-2	2-5	6-10	11+
Percentage	5.5	14.5	23.6	56.4

N = 110

Table 9

Previous Microcomputer Experience: 1984 Follow-up

Experience	Percentage of Respondents
None	55.9
One non-credit course	12.6
Two or more non-credit courses	0.9
One university credit course	3.6
Two or more university courses	4.5
Workshop attendance	9.9
Personal reading/practice	12.6

N = 111

Impact on Teachers

Attitude Towards Microcomputers

Why do teachers take inservice courses?

The percentages of teachers categorized according to their purpose for enrolling in computer courses are displayed in Table 10. Almost two-thirds of the teachers cited personal interest while nearly one-half indicated teaching preparation as their reasons for taking courses. A significant minority (one-third) indicated learning specific applications as a further reason for enrolling in a course.

Table 10

Participants' Course Goals: 1984 Follow-up Study

Goal	Percentage
Teaching Preparation	41.4
Personal Interest	63.1
Learn Specific Applications	33.3
Use Specific Courseware	7.2
Other	16.2

N = 111

Note. Percentage total exceeds 100 since multiple responses were allowed.

Why do teachers drop out of inservice courses?

Table 11 indicates that one-half of the teachers who dropped out did so because they experienced time conflicts. Almost two out of ten who did not complete inservice courses indicated that limited access to microcomputers caused them to fail to complete classes. Only about one out of ten who left the course felt that teaching instructions were vague and a similar number felt that the content was irrelevant.

Table 11

Reasons for Dropping Inservice Courses:

1984 Follow-up Study

Reason	Percentage
Time Conflict	50.0
Limited Access to Microcomputers	19.2
Vague Instructions	11.5
Insufficient Individual Help	3.8
Content Irrelevant	11.5
Pace too fast	0.0
Other	3.8

N = 26

Do teachers' attitudes about microcomputers change as a result of participating in inservice courses?

Table 12 displays the percentage of respondents who were negative, positive or undecided towards computers before and after inservice courses. There were increases in all program groups in percentage of respondents who became more positive towards computers. Group 3 Medicine Hat Basic had the greatest percentage of teachers whose positive attitudes toward computers increased from 59% to 76% (an increase of 15.9%), followed by Group 1 Calgary Basic with an increase of 14.2%, from 42.9% to 57.1% of teachers with positive toward computers. A small increase (2.1%) was evident for Group 2: 66.7% of the teachers had positive attitudes before and 76.9% after the inservice. There was a decrease in the percentage of those who were undecided in the same proportion as the increase in positive attitudes as the small percentage who had negative attitudes remained constant.

Table 12

Attitudes Towards Computers at Pretest and Posttest:

Percentage of Respondents in Each Program[1]

1984 Follow-up Study

Pretest		Posttest: Negative	Undecided	Positive	Row Total
Negative	1.	0.0	0.0	0.0	0.0
	2.	2.1	0.0	6.3	8.3
	3.	0.0	0.0	0.0	0.0
	4.	0.0	0.0	0.0	5.9
Undecided	1.	0.0	42.9	14.3	57.1
	2.	0.0	8.3	16.7	25.0
	3.	0.0	12.8	28.2	41.0
	4.	5.9	5.9	5.9	17.6
Positive	1.	0.0	0.0	42.9	42.9
	2.	6.3	14.6	45.8	66.7
	3.	0.0	10.3	48.7	59.0
	4.	0.0	0.0	76.5	76.5
Column Total	1.	0.0	42.9	57.1	
	2.	8.3	22.9	68.8	
	3.	0.0	23.1	76.9	
	4.	5.9	5.9	88.2	

[1] Programs are: 1. University of Calgary Basic (N = 7); 2. Medicine Hat Logo (N = 48); 3. Medicine Hat Basic (N = 39); 4. Medicine Hat Other (N = 17).

What is the relative effectiveness of this project compared to a university credit course in changing teachers' attitudes towards computers?

Table 13 displays the percentages of teachers who enrolled in a Calgary university credit courses versus those in the Medicine Hat Consortium courses who displayed positive, negative and undecided attitudes regarding computers. For both groups more teachers had positive attitudes after courses than before and there were fewer undecided respondents. A higher percentage of Calgary enrollees were undecided in both the pre-and posttest. In addition, a higher percentage of Medicine Hat enrollees were positive in both pre-and posttest.

Table 13

Attitude Toward Computers at Pretest and Posttest:
Medicine Hat Consortium vs. University of Calgary [1]
1984 Follow-up Study

			Posttest			
			Negative	Undecided	Positive	Row Total
Pretest	Negative	1.	0.0	0.0	0.0	0.0
		2.	1.0	0.0	3.8	4.8
	Undecided	1.	0.0	42.9	14.3	57.1
		2.	1.0	9.6	19.2	29.8
	Positive	1.	0.0	0.0	42.9	42.9
		2.	2.9	10.6	51.9	65.4
	Column Total	1.	0.0	42.9	57.1	
		2.	3.9	20.2	75.9	

[1] Programs are: 1. University of Calgary Basic (N = 7); 2. Medicine Hat Consortium (N = 104).

Skill and Knowledge Acquisition

Pre-and posttests which were administered attempted to assess teachers' knowledge of computers. The items utilized were a small sample of entire course content.

In the 1983-84 form of the instrument, functional knowledge and computer literacy were separate sections. However, in the 1982-83, this was not the case as both areas were subsumed under the category of computer literacy.

Functional Knowledge of Computers

To what extent can teachers learn how to identify the meaning of terms for microcomputer parts and functions?

Table 14 displays the pre-and posttest means and standard deviations in functional knowledge for each of the groups taking computer courses during the 1983-84 year. Table 15 gives the results of the analysis of variance and the Scheffe pairwise comparisons of group gains on this aspect.

Mean gains made by those studying Basic were greater than for those taking Advanced Basic, $F(3, 36) = 11.91$, $p < .05$, as well as for those learning computer utility programs (Data Base Managers, Word Processing and Spread Sheets), $F(3, 36) = 27.72$, $p < .01$. In addition, combined Basic and Logo language groups made significantly greater gains than did Advanced Basic and Utility Programs, $F(3, 36) = 12.71$, $p < .05$. The entry level of Group 1, Basic was significantly lower than for Group 2 Advanced Basic, $F(3, 36) = 43.92$, $p < .01$; and for Group 3 Utility Programs, $F(3, 36) = 69.22$, $p < .01$.

Table 14

Functional Knowledge of Computers: Group Means and S.D. 1983-84 Study

Group	N	Pretest		Posttest	
		Means	S.D.	Mean	S.D.
Basic (1)	17	2.41	1.00	4.41	0.87
Advanced Basic (2)	9	4.22	0.97	4.89	0.33
Utility Programs (3)	11	4.55	0.82	4.64	0.67
Logo (4)	3	3.00	1.00	4.33	1.16

Note. Utility Programs include Data Base, Word Processing and Spread Sheet.

Table 15

Anova Comparison of Group Gains in Functional Knowledge of Computers: 1983-84 Study

Source	d.f.	Mean Square	F	P
Language Group	3	4.95	4.84	.006
S_{Within}	36	1.02		
Time	1	14.08	32.11	.001
Group x Time	3	2.30	5.24	.004
Time x S_{Within}	36	0.44		

Posthoc Scheffe Pairwise Comparisons

Comparison Groups	F
Groups 1 + 4 vs. 2 + 3 (Post - Pretest)	12.71*
Groups 2 vs. 3 (Post - Pretest)	1.87
Groups 1 vs. 4 (Post - Pretest)	1.29
Groups 1 vs. 2 (Post - Pretest)	11.91*
Groups 1 vs. 3 (Post - Pretest)	27.72**
Groups 4 vs. 3 (Post - Pretest)	4.14
Groups 4 vs. 2 (Post - Pretest)	1.14
Groups 1 vs. 2 (Pretest)	43.92**
Groups 1 vs. 3 (Pretest)	69.22**

Computer Literacy

Can teachers achieve a mastery level of basic computer literacy with a minimum of 21 hours of instruction?

Before and after taking computer classes in the 1982-83 school year, the Computer Literacy portion of the questionnaire was administered to all participants. Table 16 displays the means and standard deviations for pre-and posttesting for each of the groups, while Table 17 gives the results of the analysis of variance followed by Scheffe's posthoc comparisons of gain scores.

All group means increased bringing the means more alike following the course than they were before it. The analysis of variance indicated that there were significant interaction effects among groups over time, $F(4, 75) = 5.55$, $p < .001$. When intergroup comparisons were made on gains from pre-to posttesting, the Calgary university course group made significantly less gain than the Medicine Hat inservice groups combined, $F(1, 4) = 18.06$, $p < .01$. However, the entry level of the Calgary group was higher than it was for any of the other groups.

Table 16

Group Means and S.D. in Computer Literacy: 1982-83 Study

Group		N	Pretest		Posttest	
			Mean	S.D.	Mean	S.D.
U. of Calgary	(1)	14	15.07	2.37	16.00	2.48
Logo	(2)	13	8.62	3.28	12.15	2.61
Basic	(3)	27	9.85	3.78	15.70	2.04
Basic	(4)	7	11.00	4.51	16.29	2.29
Logo	(5)	19	8.32	3.48	12.47	2.97

Table 17

Anova Comparison of Group Gains in Computer Literacy: 1982-83 Study

Source	d.f.	Mean Square	F	P
Group	4	127.96	9.17	.001
S_{within}	75	13.95		
Time	1	512.71	117.68	.001
Group x Time	4	24.19	5.55	.001
Time x S_{within}	75	4.36		

Posthoc Scheffe Pairwise Comparisons

Comparision Groups	F
1 vs. 2 + 3 + 4 + 5 (Post - Pretest)	18.06**
2 vs. 3 (Post - Pretest)	5.38
2 vs. 4 (Post - Pretest)	1.59
2 vs. 5 (Post - Pretest)	0.34
3 vs. 4 (Post - Pretest)	0.20
3 vs. 5 (Post - Pretest)	3.67
4 vs. 5 (Post - Pretest)	0.75

Knowledge of Programming Particular Computer Languages

Can teachers achieve a working knowledge of microcomputer functions in 12 hours of instruction according to the particular computer language taught (Basic, Advanced Basic, Logo and Data Base, Word Processing and Spread Sheet Utility Programs)?

Tables 18 to 21 display the results of t-testing on mean change scores from pre-to posttesting for those participating in the various computer language group courses during 1983-84. There were significant gains in mean scores for each of the following: the Basic group, $t(16) = 5.23$, $p < .01$; the Advanced Basic group, $t(8) = 3.05$, $p < .05$; the Utility Programs group, $t(10) = 4.64$, $p < .001$. However, no significant gains in working knowledge of microcomputer functions were evident for the Logo group.

Table 18

Increase in Knowledge of Basic: 1983-84 Study

Test	N	Mean	S.D.	d.f.	t	P
Pretest	17	4.71	3.48	16	5.23	.00
Posttest	17	11.24	2.95			

Table 19

Increase in Knowledge of Advanced Basic: 1983-84 Study

Test	N	Mean	S.D.	d.f.	t	P
Pretest	9	6.78	2.73	8	3.05	.016
Posttest	9	9.56	1.51			

Table 20

Increase in Knowledge of Spread Sheet, Data Base and Word Processing: 1983-84 Study

Test	N	Mean	S.D.	d.f.	t	P
Pretest	11	4.55	2.95	10	4.64	.001
Posttest	11	9.82	2.96			

Table 21

Increase in Knowledge of Logo: 1983-84 Study

Test	N	Mean	S.D.	d.f.	t	P
Pretest	4	7.75	3.69	3	1.38	.261
Posttest	4	11.25	3.20			

Teacher's Perceptions of Classroom Microcomputer Use

Do teachers increase their awareness regarding the manner of using microcomputers in the classroom?

Table 22 shows the percentage of teachers who, before and after their 1982-83 inservice courses recorded potential microcomputer applications in their classrooms. Table 23 gives the same type of information for teachers enrolled in the 1983-84 computer workshops. For the 1982-83 group, there was an increase in the number of potential applications cited from pre-to posttesting. However, for the 1983-84 group, fewer possible microcomputer applications were reported after the inservice than before.

As indicated in Table 24, even with sufficient resources available, the percentage of teachers who cited intended application of computers actually decreased in each category after the courses than before by the 1983-84 group.

Table 25 displays perceived problems in computer use and the percentage of teachers who cited each in the 1982-83 study both before and after taking computer courses. In all but courseware availability, the percentages of time each of these categories was cited increased from pre-to posttesting.

Table 22

Perceived Applications of Computers in Present Assignments Cited by Teachers: 1982-83 Study

Application	Percentage of Teachers	
	Pretest	Posttest
Computer Enhanced Learning	10.0	22.5
Computer Language Systems	11.2	15.0
Computer Assisted Instruction	65.0	77.5
Administrative Programs	41.2	48.7
Computer Managed Instruction	35.0	38.7

N = 80

Note. Total percentages are greater than 100% as more than one response was allowed.

Table 23

Perceived Applications of Computers in Present Assignments Cited by Teachers: 1983-84 Study

Application	Percentage of Teachers	
	Pretest	Posttest
Computer Enhanced Learning	41.5	31.7
Computer Language Systems	17.1	7.3
Computer Assisted Instruction	87.8	65.9
Administrative Programs	43.9	29.3
Computer Managed Instruction	24.4	19.5

N = 41

Note. Total percentages are greater than 100% as respondents listed more than one application.

Table 24

Intended Applications of Computers if Resources Available 1983-84 Study

Application	Percentage of Teachers	
	Pretest	Posttest
Computer Enhanced Learning	34.1	24.4
Computer Language Systems	9.8	4.9
Computer Assisted Instruction	78.0	56.1
Administrative Programs	39.0	26.8
Computer Managed Instruction	24.4	19.5

N = 41

Note. Total percentages are greater than 100% as respondents listed more than one application.

Table 25

Perceived Problems in Utilizing Computers in Schools

1982-83 Study

Problems	Percentage of Teachers	
	Pretest	Posttest
Availability of Computers to Students	63.7	73.7
Teacher Preparation	22.5	25.0
Courseware Availability	8.7	6.3
Timetabling	3.7	10.0
Other	10.0	16.7

N = 80

Note. Total percentages are greater than 100% as more than one response was allowed.

As a result of inservice courses, do teachers change their priorities for particular types of microcomputer programs?

Table 26 displays the rankings for selected categories of computer use according to how useful the 80 teachers from the 1982-83 group perceived each to be in relation to the others. No change in mean rank from pre-to posttesting was evident. Computer-assisted instruction was ranked first followed, in turn on both occasions, by computer language systems, computer enhanced learning and computer managed instruction.

Table 26

Perceived Usefulness of Various Types of Computer Programs: 1982-83 Study

Program Type	Rank[1]						Mean Rank	
	1	2	3	4	5	NR	Pre	Post
	Percentage of Teachers							
Computer Enhanced Learning								
Pretest	18	34	15	18	14	3	3	
Posttest	14	38	29	6	11	3		3
Computer Language Systems								
Pretest	28	15	28	15	13	3	2	
Posttest	28	20	26	10	14	3		2
Computer Assisted Instruction								
Pretest	35	31	18	9	5	3	1	
Posttest	48	25	10	14	0	4		1
Administrative Program								
Pretest	16	5	3	20	51	1	5	
Posttest	5	6	14	19	53	4		5
Computer Managed Instruction								
Pretest	9	11	30	35	13	3	4	
Posttest	3	11	16	46	20	4		4

N = 80

[1] Figures in this portion of the table represent percentages of respondents who assigned a given rank to the category in question. 1=most useful, 5=least useful, NR=no response for that category. The NR percentages include some out of range responses (i.e.,"7").

Rank Order Correlation Coefficient (Spearman's Rho) = 1.0

As a result of inservice courses, do teachers change their priorities for educational applications for microcomputers?

Table 27 displays the priorities of the various applications of microcomputers assigned by teachers according to importance. There was little shift in rankings by teachers over the period of the inservice programs as indicated by Spearman's Rank Order Correlation coefficient of .90. The relative importance assigned at the beginning for the various computer applications remained essentially unchanged. "Management of Student Progress" and "Instruction" were ranked 1 and 2, respectively on the pretest while they were split for first and second place after the inservice, giving thm each a 1.5 ranking. "Operation and Programming Skills" was assigned a middle importance rank each time while "Enrichment" was ranked fourth and "Administration" was ranked last.

Table 27

Perceived Importance of Computer Applications: 1982-83 Study

Application	Rank[1]						Mean Rank	
	1	2	3	4	5	NR	Pre	Post
	Percentage of Teachers							
Instruction								
Pretest	24	30	20	20	6	0	2	
Posttest	28	28	25	16	3	1		1.5
Administration								
Pretest	10	11	14	24	41	0	5	
Posttest	5	16	8	15	55	1		5
Management of Student Progress								
Pretest	36	26	16	18	4	0	1	
Posttest	20	36	26	15	1	1		1.5
Enrichment								
Pretest	5	16	29	19	31	0	4	
Posttest	5	14	28	24	29	1		4
Operation and Programming Skills								
Pretest	28	18	23	18	15	0	3	
Posttest	44	6	13	26	10	1		3

N = 80

[1] Figures in this table represent percentages of respondents who assigned a given rank to the category in question. 1 = most important, 5 = least important, NR = no response.

Rank Order Correlation Coefficient (Spearman's Rho) = .90

As a result of inservice courses, do teachers change their priorities for classroom use for microcomputers?

Table 28 presents priorities for use of computers according to the percentage of teachers who assigned ranks for the different categories. There was very little change in mean rank before and after computer inservice courses, the Rank Order Correlation Coefficient = .96 indicating a very high degree of agreement. "Remediation of Skill Deficiencies" remained the top priority followed by "Commercial Instructional Software" and then by "Teaching Programming Skills". "Teacher Develops Expertise" was assigned a middle rank both before and after inservice courses while "Computer Club" and "Defer to Other Classes" were ranked the lowest.

Table 29 displays the percentage of respondents according to their rankings of priorities for expansion of conputer use for particular program areas. There was no change in ranking following inservice programs; the Rank Order Correlation = 1.0 indicating perfect agreement. "Computer Training" and "Core Subject Areas" were split between first and second place both before and after inservice courses with a 1.5 mean rank resulting. "Career and Vocational Training" held the third priority both times while "French Immersion" remained last.

Table 28

Priorities for Classroom Computer Use: 1982-83 Study

Activity	Rank[1]								Mean Rank	
	1	2	3	4	5	6	7	NR	Pre	Post
	Percentage of Teachers									
Teacher Develops Expertise										
Pretest	25	6	23	13	20	11	0	3	4	
Posttest	24	15	20	13	13	11	4	1		3.5
Commercial Instructional Software										
Pretest	19	25	20	16	13	4	1	3	2	
Posttest	15	24	19	20	15	5	1	1		2
Teach Skills in Programming										
Pretest	14	25	15	20	15	8	1	3	3	
Posttest	21	14	19	20	15	10	0	1		3.5
Computer Club										
Pretest	4	6	16	18	19	26	8	4	6	
Posttest	9	11	16	16	16	24	5	3		5
Remediate Skill Deficiencies										
Pretest	36	26	14	10	9	3	0	3	1	
Posttest	26	25	18	15	13	3	0	1		1
Defer to Other Classes										
Pretest	0	3	0	1	4	9	80	4	7	
Posttest	1	1	1	0	3	6	86	1		7
Administrative Tasks										
Pretest	6	10	9	19	16	35	3	3	5	
Posttest	8	9	4	14	24	38	4	1		6

N = 80

[1] Figures in this table represent percentages of respondents who assigned a given rank to the category in question. 1 = high priority, 7 = low priority, NR = no response for that category.

Rank Order Correlation Coefficient (Spearman's Rho) = .96

Table 29

Priorities for Program Expansion: 1982-83 Study

Program	Rank[1]					Mean Rank	
	1	2	3	4	NR	Pre	Post
Career and Vocational Training							
Pretest	8	16	53	24	0	3	
Posttest	11	20	53	16	0		3
Computer Training							
Pretest	43	43	15	0	0	1.5	
Posttest	41	45	13	1	0		1.5
Core Subject Areas							
Pretest	48	39	13	1	0	1.5	
Posttest	46	31	19	4	0		1.5
French Immersion							
Pretest	3	4	19	75	0	4	
Posttest	1	5	15	79	0		4

N = 80

[1] Figures in this table represent the percentage of respondents who assigned a given rank to the category in question: 1 = highest priority, 4 = lowest priority, NR = no response.

Rank Order Correlation Coefficent (Spearman's Rho) = 1.0

Funding Priorities

What funding priorities should apply to school programs and to computer needs?

Table 30 reveals that budget priorities for different types of school programs retained the same rankings (Rank Order Correlation Coefficient = 1.0) following computer inservice as they were assigned by the 1982-83 teacher group prior to inservice. "Computer Programs" ranked first in both cases while "Second Language Programs" were ranked last. "Fine Arts" and "Work Experience" were ranked second and third, respectively on both occasions.

Table 31 displays the percentage of 1982-83 teachers who assigned given ranks to various aspects of computer software funding priorities. The Rank Order Correlation Coefficient = .90 indicating high agreement before and after training. "Skill Training" retained first position while "Programming" displaced "Commercial Educational" as the second priority. "Computer Literacy" retained the last place.

Table 30

Budget Priorities: 1982-83 Study

Activity	Rank[1]					Mean Rank	
	1	2	3	4	NR[2]	Pre.	Post.
	Percentage of Teachers						
Second Language Program							
Pretest	8	20	24	46	3	4	
Posttest	5	15	25	46	10		4
Fine Arts Program							
Pretest	18	30	31	19	3	2	
Posttest	14	30	32	19	6		2
Computer Technology							
Pretest	66	25	6	1	1	1	
Posttest	64	19	13	0	5		1
Work Experience							
Pretest	9	26	36	25	4	3	
Posttest	16	29	21	25	10		3

N = 80

Rank Order Correlation Coefficient (Spearman's Rho) = 1.0

[1] Figures in this table represent the percentage of respondents who assigned a given rank to the category in question. 1 = highest priority, 4 = lowest priority, NR = no response for that category.

[2] The NR percentages include some out of range responses (i.e.,"5").

Table 31

Funding Priorities for Computer Software Resources:

1982-83 Study

Software Category	Rank[1]						Mean Rank	
	1	2	3	4	5	NR	Pre.	Post.
	Percentage of Teachers							
Administrative								
Pretest	14	14	16	29	28	0	4	
Posttest	13	15	20	26	25	1		4
Commercial Educational								
Pretest	30	29	25	9	6	1	2	
Posttest	28	31	15	16	9	1		3
Skill Training								
Pretest	34	31	21	13	1	0	1	
Posttest	21	31	35	9	3	1		1
Computer Literacy								
Pretest	3	5	11	30	50	1	5	
Posttest	4	6	8	25	56	1		5
Programming								
Pretest	30	24	25	11	9	1	3	
Posttest	33	22	20	18	8	1		2

N=80

[1] Figures in this table represent percentage of respondents who assigned a given rank to the category in question. 1 = highest priority, 5 = lowest priority, NR = no response.

Rank Order Correlation Coefficient (Spearman's Rho) = .90

Organization of Teacher Inservice

What inservice conditions are recommended by teachers who have experienced one or more of the microcomputer courses?

Length of Inservice Time Required

Table 32 presents the percentage of teachers in the follow-up 1984 survey with the number of hours they believed, in retrospect, was necessary for them to attain functional knowledge of computers. Nearly three-quarters of the teachers felt that six hours or less was sufficient, with most of those indicating that up to four hours was needed. About one-quarter indicated that more than six hours was needed for functional knowledge of computers. Functional knowledge of computers, that is, a general awareness about computers and their applications, therefore, requires but a short inservice.

However, computer literacy which includes a knowledge of and the ability to use various utility programs on the market as well as programming requires a more extensive inservice for teachers. Table 33 shows that teachers were evenly divided along the scale in their opinions of length of total inservice required up to 30 hours, with fewer than 10% suggesting over 30 hours were needed.

Table 32

Hours of Inservice Required for Functional Knowledge of Computers: 1984 Follow-up Study

Hours	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14+
Percentage	24.1	33.3	15.7	6.3	5.4	0.0	8.3	6.5

N=108

Table 33

Hours of Inservice Required for Literacy 1984 Follow-up Study

Hours	0-18	19-21	22-25	26-29	30+
Percentage	24	19.2	23.1	24.0	9.6

N = 104

Table 34 reveals that almost two-thirds of the teachers believed that one to two hours was the ideal length of a session, while one-third indicated that two to three hours was ideal.

Table 35 displays the percentage of teachers who spent varying amount of total time in practising skills. One-half of the teachers spent five hours or less, while at the opposite extreme, nearly one-third of the teachers spent more than 20 hours practising. Only 20% of the teachers indicated they spent between five and twenty hours in total practice time.

Table 34

Ideal Inservice Session Length: 1984 Follow-up Study

Hours	0-1	1-2	2-3	3+
Percentage	1.8	63.3	33.0	1.8

N = 109

Table 35

Practice Time Spent: 1984 Follow-up Study

Hours	0-1	1-5	5-10	10-15	15-20	20+
Percentage	21.6	29.7	8.1	7.2	4.5	28.8

N = 111

Preferred Ratios for Teacher Inservice

Table 36 reveals that over one-half of the teachers indicated that 10 inservice participants learning computer per instructor was the maximum number desirable while more than one-quarter of the remaining suggested 15 as a maximum. Only about 15% suggested over 15 per instructor.

Table 37 displays the percentages of teachers with the ratio of inservice participants to a computer which they suggested as a desired maximum. Almost one-half suggested one computer was needed for each workshop participant and almost one-half suggested two per computer was satisfactory.

Table 36

Maximum Inservice Participant to Instructor Ratio: 1984 Follow-up

Ratio	10:1	15:1	20:1	25:1	other
Percentage	58.2	27.3	6.4	1.8	6.4

N=110

Table 37

Maximum Inservice Participant to Computer Ratio: 1984 Follow-up

Ratio	1:1	2:1	3:1
Percentage	48.6	49.5	1.8

Class Organization

Teachers' preferred class organization is presented in Table 38. Teachers were asked to indicate preference for size of group, pacing according to capabilities of individuals and combinations of these two. Nearly one-half of the teachers suggested a combination of small group organization, paced according to individual progress and self-paced, while the remaining were divided in their preference.

Table 38

Preferred Class Organization: 1984 Follow-up Study

Method	Percentage
1. Large Class Paced	18.0
2. Small Group Paced	14.4
3. Self-Paced	18.9
4. Combination of 2 and 3	45.0
5. Other	3.6

Usefulness of Microcomputer Inservice for Teaching

How well did the microcomputer courses prepare teachers to teach students?

Table 39 indicates the percentage of teachers and their level of experience teaching various Alberta Education computer literacy courses or units. Of more than 100 teachers, only 12.6% had any experience teaching computer literacy.

Table 40 shows that half of the teachers who had taught computer literacy believed that the Medicine Hat computer literary workshops were either very useful or useful while the remainder believed they were of little or no use.

Table 39

Experience Teaching Computer Literacy or Data Processing: 1984 Follow-up Study

Courses Taught	Percent of Teachers
Elementary Computer Literacy	5.4
Junior High Computer Literacy	5.4
Computer Literacy	0.0
Computer Literacy 10X	1.8
Computer Processing 10 - Business	0.9
Computer Processing 20 - Business	0.9
Computer Processing 30 - Business	0.0
Percent with experience in 1 or more categories	12.6[1]

N = 111

[1] Total percentage in above categories exceeds 12.6 since multiple responses were allowed

Table 40

Perceived Usefulness of Computer Literacy Inservice for Teaching Alberta Education Computer Literacy Units Respondents with Experience in Teaching Literacy[1] 1984 Follow-up Study

Perceived Usefulness	Percent
Very Useful	25.0
Useful	25.0
Of Little Use	41.7
Of No Use	8.3

N = 12

[1] One additional Medicine Hat response was discarded since it contained a check in two non-adjacent categories. Only one respondent with experience in literacy teaching had attended the U. of Calgary course (not included in this table). This respondent perceived the U. of Calgary course to be of little use for preparation for teaching literacy.

General Comments on Inservice Improvement

Teachers were asked to give general comments for computer teacher inservice improvement. These comments were categorized and are presented in Table 41. The largest percentage of teachers (9%) suggested more emphasis on courseware than on programming, with one-half of that number suggesting specific courses for specific needs. A variety of other suggestions were also given by teachers and are included under "Other".

Table 41

Improvement of Inservice: 1984 Follow-up Survey

Suggestions for Improvement	Percentage of Teachers
More emphasis on courseware than programming	9.0
Give specific courses for groups with specific needs	4.5
Change to school hours and release teachers	0.9
Make micros available in schools for practice	0.9
Miscellaneous responses	22.5
No response	70.3

N = 111

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Background Characteristics of Teachers

Summary and Conclusions

From the data, it can be concluded that elementary and older teachers enrolled in inservice courses more frequently than any other teacher group. More than one-half of all teachers in the 1982-83 year were elementary teachers. More than one-half of the teachers had in excess of ten years of teaching experience while about one-quarter had taught from six to ten years (1984 follow-up data). In the 1982-83 year alone, the single largest group had more than 15 years of teaching experience.

One can conclude that the teachers, in general, had little or no previous microcomputer experience. More than one-half had no previous experience. The next largest groups had learned about computers only through informal experience or personal reading or had taken one course.

Commentary

It is evident from the data that an assumption sometimes held regarding older people's approach to innovation cannot be made. Older teachers did not need more urging to take microcomputer inservice courses. On the contrary, they are more likely as a group to enroll in such courses.

Impact on Teachers

Summary and Conclusions

Attitudes towards computers. More positive attitudes towards computers were evident following inservice in all groups. The greatest increases in positive attitudes were in the University of Calgary and Medicine Hat groups, both of whom were taught BASIC. Although courses did alter the views of those who were undecided prior to the inservice, they did not change the negative views that a small number held. A larger percentage of students taking classes from the Medicine Hat Consortium had positive attitudes both before and after classes than was the case for those taking classes from the University of Calgary.

It can concluded that inservice courses increased the number of teachers who had positive attitudes about computers for all program groups in a somewhat similar fashion.

Microcomputer knowledge. From the available data, one can conclude that all groups made gains in knowledge during their computer courses. In the 1982-83 year the Medicine Hat inservice groups made greater gains than did the Calgary University extension course group in computer literacy. However, the University of Calgary group began with a higher mean score than did the other groups. The 1983-84 BASIC group made the most significant gains in functional knowledge of computers but their pretest mean was significantly lower than that of the other groups. All groups in the 1983-84 year, except those in the LOGO group, made significant gains in a working knowledge of the language taught.

Microcomputer applications. Teachers' recording of potential microcomputer applications in classrooms increased in every category after courses for the 1982-83 group but decreased in every category for the 1983-84 group. In addition, intended applications if resources were made availabe decreased in every category for the 1983-84 year. Priority mean rankings changed very little or not at all in the areas of perceived usefulness of computer programs, importance of computer applications, types of classroom computer use, subject areas of preferred computer expansion and types of software resources. Therefore, one can conclude that little if any change occurred in the area of computer applications as a result of computer courses.

Commentary

Although inservice courses produced positive attitudes in a majority of teachers, one wonders why the shift was so slight and quite similar in magnitude for all groups. One would expect that all teachers would be positive towards computers, once they had become more knowledgeable and experienced with computers.

Computer courses did prove advantageous in enhancing knowledge. One can speculate what caused greater improvement in the Medicine Hat Consortium groups compared to those by the University of Calgary. Perhaps the more positive attitudes towards computers before courses of the Medicine Hat Consortium groups may be partly responsible for the greater improvement in knowledge compared to the University of Calgary students. However, it is important to note that the pretest scores for the University of Calgary group was considerably higher than it was for the other groups.

It is unclear why teachers would list fewer applications, both possible and intended, after courses than before in the second year of the program while the opposite was the case in the first year. Perhaps, prior to any courses, they had very little knowledge of computers and therefore, of applications. Following a first course, some knowledge created enthusiasm for computer use. Once they had more information following a second course, they were more realistic in their view of computer applications in the classroom.

Teacher Motivation for Inservice

Summary and Conclusions

It can be concluded that teachers took computer courses for a diversity of reasons. Personal interest was cited by more than one-half of the teachers and teaching preparation by nearly one-half.

Of the teachers who did not complete inservice, one-half gave time conflicts as their reason. However, responses of the remainder indicated some dissatisfaction with course instruction and availability of microcomputers. Therefore, one can conclude that although teachers were motivated to enroll in courses, dissatisfaction with classes caused one-half of respondents who dropped courses to do so while the remaining one-half dropped for reasons not directly related to classes.

Commentary

It is noteworthy that only a small number expressed dissatisfaction with some aspect of courses. However, what is not known is the reason for abandoning courses of those who did not respond to the follow-up questionnaire as the respondents represent but a small portion of all those who abandoned courses.

The dropout rate for the 1982-83 year was much greater than it was for the subsequent year. Informal feedback to program directors suggest that this difference may have been, at least partially, instructor related. The 1983-84 courses were taught by teachers who were more aware of classroom and teacher needs than were the previous year's instructors who were college teachers, not familiar with regular classrooms.

The high enrollment for the 1982-83 year which was also noted in the pilot study conducted the previous year may have been due to the initial enthusiasm and interest resulting from the high public profile of computers in the media and the business world. When teachers realized computer courses were not what they expected, they began to drop out. In the second year of the study, the enrollment was much lower and so was the drop-out rate. The initial aura and novelty of computers had perhaps begun to fade by this time or teachers became more computer-wise.

Organization of Teacher Inservice

Summary and Conclusions

Amount of inservice time required. From the data, one can conclude that six hours or less were required for computer literacy according to about three-quarters of the teachers. However, the length of inservice required for literacy plus programming appeared inconclusive as teachers were evenly divided in the range of time they believed was needed up to 30 hours.

One to three hours appeared to be an adequate session length according to most of the teachers. The amount of practice time which seemed to be needed according to teachers' experience was less than five hours for one-half of the teachers, while for more than one-quarter it was more than 20 hours.

Ratios. It can be concluded that 10 to 15 participants for every instructor is a suitable ratio since that was the preferred ratio for more than three-quarters of the respondents. A computer for every one or two participants is needed according to teachers who were evenly divided in their preference.

Class organization. A combination of small-group-paced and self-paced instruction was the preference of about one-half of the teachers. Therefore, it can be concluded that this type of class organization is the most suitable for teacher inservice.

Commentary

The length of inservice teachers believed was required for computer literacy and the amount of practice time which teachers actually carried on brought the greatest divergence in the teacher group. It appears that some felt a greater need for class and practice time than did others. This may be due to the fact that teachers differed in their experience with and knowledge of computers.

Usefulness of Microcomputer Inservice for Teaching

Summary and Conclusions

Although one-half of the small number of teachers with experience in teaching Alberta Education units in computer literacy found inservice courses useful, the remaining one-half found them of little or no use. Therefore, one can conclude that inservice courses failed to be useful to all those providing instruction in the Alberta Education Computer Literacy units. However, these inservice courses were not designed to provide competency in teaching of these units.

Commentary

It would be interesting to speculate why anyone would fail to find inservice courses in microcomputers at least somewhat useful for subsequent teaching. However, teachers were not asked why they did not find courses useful in this respect.

General Conclusions

The Consortium composed of representatives from the various school jurisdictions was successful in effectively carrying out computer inservice for teachers. Through this cooperative venture, needless duplication of services was avoided and specific guidelines for offering future inservice courses were identified.

Recommendations

As a result of analyzing the data on knowledge gained and opinions of teachers regarding inservice courses, it is the recommendation of this study:

1. that inservice courses continue to be offered to Alberta teachers.
2. that districts establish long-range plans for applications of computer technology in schools and inservice directly geared to these needs.
3. that consortia of small school systems be considered to plan and coordinate inservice efforts.
4. that needs of teachers be assessed before courses are initiated.
5. that instructors be hired, if at all possible, who are viewed as resident computer experts within schools, are actively teaching computer classes for students and are reputed to be effective teachers in general.
6. that instructors be provided with guidelines and

expectations for the courses they will teach.

7. that, based on these guidelines, instructors develop a specific course outline to be approved by a systems coordinator or consortium steering committee and made available to teachers before course registration.
8. that as a first step in staff inservice, at least one person in each school be trained in computer literacy in order to have on-site resource personnel for others taking inservice courses.
9. that a first level, six hours course of instruction be provided for interested teachers to enable them to acquire a functional understanding of microcomputers and to prepare them to utilize CAI in the classroom.
10. that computer literacy (functional knowledge plus programming) courses be scheduled for 20-30 hours, depending on background of participants, specifically for those involved in teaching Alberta Education computer literacy curricula to students.
11. that courses be scheduled at appropriate times to enable teachers to participate.
12. that curriculum taught in inservice classes consist of information which will be needed by teachers in schools.
13. that ratio of teachers to instructor not exceed 10:1 or 15:1.
14. that ratio of teachers to microcomputers in inservice sessions not exceed 2:1 (more people indicated 2:1 as more appropriate than 1:1).

15. that the duration of class sessions be no longer than three hours.
16. that some provision be made to accomodate individual differences while teaching continues in small groups.
17. that microcomputers be made available in each school and/or on a loan basis to teachers to provide easy access for computer practice.

APPENDIX A

REVIEW OF RELATED LITERATURE

Review of Related Literature

> At first computers were only for the `priestly' class that could both read and write the lingua electronia. All users depended on this group of plugged-in clergy. (Compaine, 1983)

The analogy to literacy of language centuries ago is obvious. The disappearing elitism that took place as the printed word and instruction became available to the masses is however resurrecting in the computer age today.

Obviously ours is a society governed by the flow of information and more and more this information flow is mediated by computers. "To suggest that computer literacy be denied our children is elitism in the extreme. In the information age, those of us who are computer literate will be at a tremendous advantage over those who are not" (Thornburg, 1982).

The majority of people today, including educators are endorsing the importance of at least the "literacy" aspect of computers. What is unclear, however, are the meanings that are being attached to the term.

As educators, we are not settled on what we would specify as literacy for students throughout the grades nor can we then be clear as to the extent to which teachers are to be engulfed. It is this latter aspect on which this study concentrates, even though the scope and sequence of student involvement will of necessity implicate teachers.

What is occuring today is a great deal of experimentation and piloting of computer curriculum. Specifically, in Alberta, such piloting programs will be operating in grades IV-XII. As to whether or not teachers will be prepared or willing to handle the topic can only be conjectured at this time.

The pressure will be applied as indicated by the policies of government and local school jurisdictions. Alberta Education's Minister has stated that he is "definitely looking into the establishment of certain requirements for computer literacy in teacher preparation programs" (Hat News, 1981). School jurisdictions will likely be looking at computer "literacy" as a requirement for hiring at some point in the future.

Inservice opportunities on literacy will undoubtedly increase dratically over the next years; perhaps even while it is unclear as to the approach, agenda and extent of such teacher involvement. What follows is a review of various conjectures as to what relevant computer literacy for teachers should be; the status of opportunities and support for such literacy, as well as what the future holds in this area, according to the literature.

Obviously the greater degree of involvement by students in the operation of computers, the greater the extent to which teachers must be knowledgeable and experienced in their function. Questions such as: "What should be taught? How should the teaching of computer skills influence current school curriculum?" should have had answers yesterday so as to help us as educators today.

Computer Literacy Defined

Marshall (1982) views computer literacy essentially as knowledge, "knowledge of what computers can and cannot do, knowledge of applications, knowledge of abuses, plus an awareness of their impact on society." Arthur Leuhrmann (1981) distinquishes between computer awareness and literacy by saying that literacy must mean the ability to do computing and not merely to recognize, identify or be aware of alleged facts about computing. He too draws the analogy between computer and language literacy. "Literacy in language means the ability to read and write, that is to *do* something with language, not merely to *recognize* that language is composed of words, to *identify* a letter of the alphabet, or to be aware of the pervasive role of language in society" (p. 683).

In their book entitled *Computer Literacy*, Luehrmann and Peckmann (1983) write of controlling the computer to free oneself from the dependency of so-called experts. "When you become computer literate, you will know two important things: (i) what things a computer can do, and (ii) how to tell a computer to do the things you want it to do" (p. 1). Gawronski (1981) supports this notion when she specifies that computers are essentially tools for solving problems. "A computer literate individual should know how to write an individual program. The computer is a problem solving tool as writing computer programs utilizes problem solving abilities" (P. 613).

Horn (1981) defines computer literacy as a "new area knowledge that includes: (i) and understanding of the technology used when processing information, and (ii) an understanding of how computers are problem solving tools". Horn emphasizes that the skills and knowledge necessary to be computer literate today will likely change with each new technological development.

The Alberta Computer curriculum pilot document uses the following definition of literacy. It too may change by the time of full implementation.

> To be computer literate one must be able to describe, demonstrate and/or discuss (critically) how computers are used; how computers do their work; how computers are programmed; to use a computer and how computers affect our society. (p.2)

Perhaps this definition falls short in terms of the "doing" aspect of literacy.

Sippl's (1980) third edition Computer Dictionary and Handbook does not contain a definition of computer literacy. Perhaps this is indicative of the current fluid state of the term and the fact that it is being tried and tested, still to change as new developments unfold.

Regardless, the point is that educators will, of necessity, be at the cutting edge of all that is to encompass computer literacy. Significantly, as Compaine (1983) writes: "History suggests one does not have to be fully literate to participate in literacy" (p. iii).

How Should Teachers Be Involved?

A 1982 conference on "Implications of Communication Technology", although generating differing views such as the extent of teacher involvement, concerns for funding and the uncertain future did report with relative consensus that:

> Immediate needs include that teachers must become computer literate if they wish to control process and school programs instead of becoming uncritical consumers of mass-produced, educationally unsound and commercially profitable programs. Inservice programs will be required to alleviate stress in teacher public relations. Stakeholder groups will have to cooperate in providing funds for equipment and training programs at all educational institutions, and to ensure that the technology and techniques used are applied generally, universally and in the best interest of students and the society in which they live. (p. 15)

As early as 1978, reports (DeRose, 1979) showed that no clear majority of teachers at any grade considered computers or computer terminals necessary" (p. 37).

In so few years, the personal computer has made its impact on teachers of most subjects and perhaps all grades. Now, Waugh (1982) indicates, educators are asking such questions as:

> 1. Where do computers best fit into the educational process?
> 2. What is it about computers that should be taught?
> 3. When should computers be taught?
> 4. How should they be taught? (p. 8)

Waugh then quotes Mosmann's 1980 taxonomy of ways in which computers can be used in schools:

1. Instruction about computing;
2. Problem solving;
3. Drill and practice;
4. Tutorial;
5. Simulation;
6. Interactive use of computer data bases;
7. Peripheral or managerial.

The coming demands on teachers in regards to handling these and perhaps other aspects of computing will not likely diminish.

In 1978, the elementary and secondary schools of the Association for Computing Machinery Curriculum Committee commenced work on a set of curricular and teacher training guidelines for the integration of computers with American public schools. Their February 1980 report (Poirot, 1980) outlined a set of competencies which they visualized as universal in scope and needed by all teachers and educational administrators, regardless of discipline. These are the computing competencies which all school teachers should have to teach effectively in a society permeated by computers:

> Be able to read and write simple programs that work correctly and to understand how programs and sub-programs fit together into systems;
>
> Have experience using educational application software and documentation;
>
> Have a working knowledge of computer terminology, particularly in using computers in education, some types of problems that *are* and some general types of problems that *are not* currently amenable to computer solution;
>
> Be able to identify and use alternate sources of current information on computing as it relates to education;
>
> Be able to discuss at the level of an intelligent layperson some of the history of computing as it relates to education;

Be able to discuss moral or human-impact issues of computing as they relate to societal use of computers generally, and educational use particularly.

Competency levels for those instructors who are teaching computing as a subject are similar to those of a computer professional. In addition to teaching, however, these individuals are also a general resource for computer-related information for faculty, administration and students. The core concepts listed below are in addition to an enhanced version of general teacher competency levels:

Be able to write and document readable, well structured individual programs and linked systems of two or more programs;

Be able to determine whether they have written a reasonably efficient and well organized program;

Understand basic computer architecture;

Understand the range of computing topics that are suitable to be taught as well as the justification for teaching these topics;

Know what educational tools can be uniquely employed in computer science education;

Develop the ability to assist in the selection, acquisitions and use of computers; interactive terminals and computer services which are suitable to the enhancement of instruction; and

Be able to assist teachers in evaluation, selection and development of appropriate instructional materials which utilize computing facilities.

The level or subject competencies specific to each discipline include an extensive array of possibilities. A general awareness of computers in educational research, administration, and instruction (drill-and-practice, games, tutorials and simulations) will assist in developing useful competencies. In terms of these subject specific competencies, the teacher should:

Be able to use and evaluate the general

> capabilities of the computer as a tool for pursuing various discipline or level-specific educational tasks;
>
> Be able to use and evaluate alternative hardware and software systems designed to function as tutors or teacher aides;
>
> Be familiar with alternative hardware and software systems designed to perform school administration; and
>
> Be familar with information and quantitative techniques of study in the (teachers') subject. (Poirot, 1980, p. 18-19)

Much concern is being aired with regards to how teachers will use computers once they become literate. It's one thing to know about and still another to make appropriate use of the technology. We have been through a number of such circumstances. Dwyer (1980) asks teachers to see the possibilities for diversity with the computer. His concern is primarily with the CAI aspect of computers.

> The mistake that is easy to make in connection with the use of microcomputers is to assume that, because computers represent one of the most ingeneous inventions developed by man, coupling these inventions with old instructional practices will cancel out the errors in these practices." (p. 82)

His concern is also with publishers who will make it easy to do the same.

Leuhrmann (1980) sees two kinds of literacy that must be addressed. First, he sees a literacy program for all future teachers. These are secondary school students who must be given the basic skills in computer use, including "hands-on operation, programming and problem solving ... they must also make further use of these skills in mathematics, science, language arts, etc. and in vocationally oriented courses in word processing, accounting and the like" (p. 98).

The second type of literacy is necessary because teachers received their education "BC": before computers. Leuhrmann refers to such literacy programs as "school based", specially designed ways and means of orienting practicing teachers to computers. He also suggests that various incentives be offered for having teachers and administrators develop their own computer skills.

Opportunities for Teaching Literacy

Prior to any wholesale efforts at rendering educators computer literate there are specific needs which must be considered. They are as Luehrmann (1980) states:

> 1. Adequate and appropriate equipment;
> 2. An available usable curriculum;
> 3. Materials for students and teachers;
> 4. One or more teachers in each school who are trained in computer use; and
> 5. Community, political and financial support for such programs. (p. 98)

What is significant is that the absence of as few as one of these factors will render literacy programs ineffective. What's more, it appears to be important that all factors come along simultaneously. Adequate equipment with delays in providing or developing suitable curriculum or trained people could result in lost momentum and an uncertain future.

Numerous approaches to rendering teachers "literate" are unfolding through both Canada and the United States. Martin (1982) recommends that school systems coordinate their funding through such efforts as:

1. Providing professional inservice days for computer literacy training;
2. Creating resource centres;
3. Providing resource staff, especially in software and hardware areas;
4. Devoting part of teacher meetings to computer literacy;
5. Designating a resource teacher within each school.

The training models for teachers fall generally into two categories:

Category 1, awareness level: Teachers here will have a working knowledge of computer terminology, history and social issues.

Category 2, functional level: Here teachers use computers in programming and with existing software.

It is generally agree that Category 1 level will come relatively easily through short term strategies such as conventions, workshops, institute days, lectures or reading. Functional literacy defined as Category 2 will come with more difficulty since requirements are for more long-term intense study and with hands-on computer experience. As Metzcus (1983) in a recent conference address said: "There are no shortcuts to functional computer literacy. For all concerned there is a price to pay and the price is time, effort and more of the same.

Courses at both the undergraduate and graduate level are being offered in most colleges and universities. Perhaps the following syllabus is not typical of all university programs, but it is indicative of the increased concern for literacy at post secondary institutions.

Syllabus of Computer Literacy Workshop

University of Maryland, 1981

Day	Lecture	Lab Activities
1	Orientation Computers in fiction	Attitude questionnaire Getting on/off the computer
2	History of computers	Computer drills, games and packaged programs
3	Number of systems activities	BASIC programming
4	Parts of a computer; Problem solving	BASIC programming; Problem solving activities
5	Problem solving	BASIC programming; Flowcharting
6	Problem solving	BASIC programming
7	Computer applications	Programming problems
8	Field trip to local computer installation in business and government	
9	Curriculum integration of computer literacy	Programming problems
10	Presentations by teachers of units of study	Programming problems
11	Software evaluation techniques	Courseware development
12	Social impact - speaker and activities	Courseware development
13	Possible resources	Courseware development
14	Oral reports on teacher-written courseware	Courseware development
15	Vendor demonstrations	Evaluation

As to whether a 45-hour course such as that above would render a teacher functionally literate in terms of being able to offer introductory courses to students, is questionable.

The Minnesota Educational Computing Consortium (MECC), created in 1973, has been perhaps the most successful in terms of a comprehensive approach to implementing computers on a state-wide basis. MECC employed ten teacher trainers on a school year basis to present workshops, teach classes, organize conferences, publish newsletters and respond to telephone queries. Trained coordinators from the individual school jurisdictions would then provide more indepth service training to their local colleagues. The MECC staff emphasized instructional topics more than technical ones. The reason for this, according to Rawitsch (1982), is that, "more important to educators in the long run are such topics as how to integrate computing into the curriculum, how to evaluate instructional courseware, and how to plan an overall computing program" (p.35).

Clearly, the literature is adding support to the more comprehensive view of computer literacy for educators. Zakariya (1982) writes that "helping teachers develop realistic and practical knowledge about microcomputers and full confidence about using the machines is a vital first step in any computer education program" (p. 52). It is this aspect of using the machines that is broadening the scope of training programs.

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APPENDIX B

1982 PILOT STUDY

1982 PILOT STUDY

Background of the Study

From February to June, 1982 inservice orientation sessions on the use of microcomputers were conducted for approximately 140 teachers and other employees of several of the jurisdictions involved in the Medicine Hat and District Computer Consortium.

The sessions were held in groups of 20, meeting for three hours per week over a seven week period, for a total of 21 hours. With a few exceptions, participants worked on a one to one basis with microcomputers. One instructor handled all of the sessions. A variety of methods were employed. Some of the classes were largely taught as a whole group with the mode of instruction being mostly a presentation by the instructor followed by individual practise on the microcomputer with individual help being provided by the instructor. Other classes relied more on handouts of self-instuctional materials, with individual assistance being provided by the instructor.

Purpose of the Study

The purpose of the field study was to gather information on ways to organize and operate inservice orientation sessions and to get preliminary answers to some of the research questions that were to be used in the main study.

Instrumentation and Sample

A 15-item self-reporting questionnaire was used to gather data. It was divided into sections and comprised the following:

1. background information, such as teaching assignment;
2. organizing inservice which centered on the best ways to set up inservice sessions;
3. use of microcomputers in schools which assessed attitudes about the use of microcomputers in schools; and,
4. using and programming microcomputers which attempted to assess how much people had learned.

Although 140 people initially signed up for the courses, there were some dropouts before the courses were over, and of the remaining groups only the teachers were asked to complete questionnaires. There were 95 questionnaires distributed and 59 returned. This is a 62% return rate.

Limitations of the Study

The results of this field study can only be considered as suggestive for several reasons:

1. The population that completed the questionnaire might not be representative of the total group involved in the inservice.
2. No rigorous statistical procedures were used to determine the significance of results.
3. The self-reporting format may not be an accurate assessment of the real situation, especially insofar as the level of skill development is concerned.

RESULTS OF THE STUDY

Inservice Organization and Procedures

Based on their experiences in the inservice sessions, teachers responded to organizational and procedural factors. The percentages of teachers who responded to each of the items dealing with these aspects is summarized in the following:

1. The number of hours of formal, in-class instruction needed to develop a working knowledge of how to run courseware and write programs in BASIC or LOGO is:

a.	less than 18 hours	6	(11%)
b.	19-21 hours	13	(23%)
c.	22-25 hours	15	(28%)
d.	26-29 hours	13	(23%)
e.	Other (specify)	9	(16%)

The majority of respondents (67%) indicated the 21 hour courses were too short. All people who checked "Other" indicated the need for a considerably greater number of hours.

2. The best length for each inservice session is:

a.	less than one hour	0	(0%)
b.	1-2 hours	32	(52%)
c.	2-3 hours	27	(44%)
d.	Other (specify)	2	(3%)

The large majority (96%) thought three hours was an absolute maximum, and a majority of people (52%) thought two hours was a reasonable maximum. However, no one felt anything less than one hour was adequate.

3. A workable ratio of students to an instructor is:

a.	10 students to 1 instructor	32	(54%)
b.	15 students to 1 instructor	18	(31%)
c.	20 students to 1 instructor	4	(7%)
d.	25 students to 1 instructor	0	(0%)
e.	Other (specify)	5	(8%)

The large majority of people (85%) felt 20 students were too many for one instructor. In fact the majority (54%) thought half that number was best.

4. The most effective way to organize a group for instruction is to:

a.	Start all participants at the same place in the program and have the move through it at the same rate. The instructor would present the information and provide individual help as needed.	8 (12%)
b.	Put participants in small groups according to previous training and have each small group move through the program at a different rate. The instructor would present new material to each group individually.	26 (40%)
c.	Provide each participant with a step-by-step self-teaching guide to go through at their own rate. The instructors would be available for individual help as needed.	9 (45%)
d.	Other (specify)	2 (3%)

Although the large majority of participants indicated in another question that they had no prior experience with microcomputers before this orientation course, most of them (85%) thought some provision to accomodate individual differences was needed.

Project Research Questions

The research questions which were the focus of the study and the portions of the questionnaires dealing with these research questions are given below along with the numbers and percentages of teachers for each category.

1. Can teachers achieve the computer standard of mastery with a minimum of 21 hours of orientation with respect to the following?
    a. Operationalizing of basic vocabulary (eg. run, catalog, load, copy, list, initialize, etc.)
    b. Using keyboard functions (eg. return, shift, escape, reset, control, repeat, etc.)
    c. The use of commercially available CAI programs. To be able to run and interact with these programs unassisted.

Since the research question appeared to be mainly related to the BASIC language, only the 30 questionnaires from people who took the BASIC course were analysed. The other 29 teachers took a course based on the LOGO language. To answer this research question the following self-reporting item was used:

If you took BASIC, mark (x) the things you feel you could do after the microcomputer course:

a.	Use courseware such as Elementary My Dear Apple	28 (93%)
b.	Use the CATALOG command	29 (97%)
c.	Initialize a new diskette	26 (87%)
d.	Copy programs from one diskette to another	24 (80%)
e.	Use special keys such as ESC, REPT., RESET	28 (93%)
f.	Use the commands RUN, LIST, RETURN, NEW	30(100%)
g.	Use PRINT with numbers and words	28 (93%)
h.	Use LET statements	26 (87%)
i.	Use INPUT statements	24 (80%)
j.	Use GOTO	26 (87%)
k.	Use IF/THEN	18 (60%)
l.	Use FOR/NEXT	13 (43%)
m.	Use GOSUB	11 (37%)
n.	Use RND(X)	8 (27%)
o.	Use Low Resolution Graphics	10 (33%)

As a group these teachers appear to have achieved a high level of skill and knowledge relative to the level of expertise implied by the research question. Their reported level of achievement could not have been the result of previous courses because twenty-two reported no previous experience, one reported only conference attendance, one reported previous home study, and six indicated they had taken one previous course.

2. To what extent do teachers recognize the degree to which microcomputers can be utilized in the classroom?

Responses to a question on the best use of microcomputers in the classroom attempted to get at the research question. Although only 59 people answered this question, thirteen of them checked two or more uses. Therefore, the total number of responses is 72.

a.	Computer Assisted Instruction (CAI) to teach students concepts and skills in various subject areas.	29 (40%)
b.	Teaching students a computer language such as BASIC or LOGO.	19 (26%)
c.	Computer managed learning in which a students mastery of a subject is diagnosed, problem areas defined, and follow-up exercises suggested.	20 (28%)
d.	Other (specify)	4 (6%)

Forty-six of the 59 people (78 %) who answered this question indicated a preference for one use of the microcomputer, that is, mainly for Computer Assisted Instruction. However, of the 59 people who responded, 13 (31%) indicated two or more of the uses would be best, even though the question implied a single answer. A surprisingly high number (20) thought computer managed learning would be a good application, even though they had not been exposed to it in the inservice sessions.

3. What attitude changes do teachers exhibit that can be attributed to the orientation sessions on computers?

To answer this question the following item was used on the questionnaire. The responses are shown:

> Which before and after sequence below best describes your attitude toward the use of microcomputers in schools before you took the course last spring and after you completed the course:

	Before		After		
a.	negative	-	negative	0	(0%)
b.	negative	-	undecided	4	(7%)
c.	negative	-	positive	1	(2%)
d.	undecided	-	undecided	6	(10%)
e.	positive	-	negative	0	(0%)
f.	positive	-	undecided	9	(15%)
g.	positive	-	positive	22	(37%)
h.	undecided	-	positive	16	(27%)
i.	undecided	-	negative	1	(2%)

By grouping responses to b,c,f,h, and i, it is found that 31 of the 59 people or 53% reported changing their attitudes in some way as a result of taking this course. Of these, the majority (68%) changed attitudes in a positive direction. Most of the teachers (90%) who changed their attitudes in a positive direction had six or more years of teaching experience, while those who changed in a negative direction were almost evenly distributed across experiential levels.

Conclusions

Answers to specific items on the questionnaire and optional comments made by teachers generally indicated they thought:

1. A computer orientation course which goes beyond orientation to teach BASIC programming should be longer

than 21 hours.

2. Each session should be shorter than 3 hours.
3. A student/instructor ratio more favorable than 20:1 should be provided.
4. Changes in teaching procedures should be implemented.

However, responses to other items showed the sessions as organized had a positive impact on literacy levels and attitudes. The acceptability of the levels of literacy and attitude changes achieved is a matter of judgement.

It should be reiterated that the findings and conclusions of this field study should be treated as suggestive only because of the limitations previously mentioned.

Student Evaluation

From the outset of the Consortium interest in computers both locally developed courses and option programs were being offered to increasing numbers of students. It was decided by the Steering Committee that some form of student evaluation should take place. As a result three consortium schools (Alexandra Junior High, Irvine and Seven Persons) where some students had been introduced to computer programming were tested (See Appendix A for student questionnaire forms).

Reports from all schools and groups within schools are summarized and presented in the following section. Only one group from Alexandra Junior High included pretest data. For all other groups data are posttest only.

The Background section included information on numbers of students with home computers, types of programs written by students and resources used by students. This latter item is not included in the data since only the Irvine and Seven Persons groups gave computer class and teachers as their response.

The Opinionnaire portion items on attitudes towards computers and perceptions of effects of computers on their own future. Students from all schools showed generally very positive attitudes towards computers. Therefore, this aspect of the opinionnaire is omitted in the presentation of the data.

The third part of the questionnaire was a 25-item test of computer literacy. Data on numbers of participants as well as length of computer courses are included in this chart.

Background of Students Enrolled in Computer Classes

Junior High Students' Posttest Results

Groups	Home Computers	Students' Programming Experience
Irvine	3	Wide variety (counting, graphics, conversational, games)
Seven Persons	2	Wide variety (simple question-answer, graphics, games)
Alexandra-1		Fairly complex programs in class by all students
Alexandra-2		
Pretest	0	No appreciable experience
Posttest	0	Moderately complex programs in class by all students
Alexandra-3	2	Moderately complex programs in class by all students
Alexandra-4	2	Simple programs in class by all
Alexandra-5	0	Simple programs by all in the club
Alexandra-6	1	Simple programs by all More complex programs by a few

Note. All results are posttest, except where indicated. The numbers following Alexandra represent various groups in Alexandra Junior High School. All groups were grade nine students, except Alexandra-4 which was grade eight, Alexandra-5 which was grade seven and Alexandra-6 which was grade eight and nine. Groups Alexandra-5 and 6 were computer clubs.

Effects of Computers on Students' Future

Opinions of Junior High Students

Groups	Opinions
Irvine	Future employment, facilitation of budgeting, record keeping
Seven Persons	Future employment prospects, career choices
Alexandra-1	Future employment
Alexandra-2	Future employment
Alexandra-3	Future employment
Alexandra-4	Future employment
Alexandra-5	Future employment
Alexandra-6	Future employment

Computer Literacy Scores of Junior High Students

with Grade Level and Number of Instructional Hours

Group	Grade	Hours	N	Possible	Mean	Median	Mode	S.D.	Range
I- Post	9		24	25	13.80			3.70	9-22
SP-Post	9		22	25	16.80			3.46	10-23
A1-Post	9	90	7	25	14.40	14	15	2.03	10-17
A2-Pre	9	45	7	25	7.57	6	9	2.06	4-10
-Post				25	14.29	13	14	2.31	12-19
A3-Post	9	30	23	25	10.78	10	11	2.57	8-20
A4-Post	8	90	26	25	11.65	11	11	2.93	5-18
A5-Post	7	30	14	25	13.55	13	15	2.93	7-19
A6-Post	8-9	30	17	25	13.4	11	11	5.39	5-22

APPENDIX A

MEDICINE HAT COMPUTER CONSORTIUM

Student Evaluation

Part I Background Information
Part II Opinionaire
Part III Computer Literacy

prepared by

Cameron Barbour, Seven Persons School
Lorne Cooper, Alexandra Jr. High School
John Letourneau, St. Mary's School
Piet Visser, Irvine School

26 January, 1983

Name ______________________

Grade ________

School ______________________

I. Background Information

1. Do you have a computer at home? ________

2. If so, what kind of computer do you have? ___________________________

3. Have you written any computer programs of your own? _________

4. If so, briefly describe one of your programs

____

____

____

5. If you answered question #3 with "yes", indicate which of the following you used to help you:

_____ books

_____ magazines

_____ clubs

_____ computer class(es)

_____ teacher(s)

_____ other people (specify who ___________________________)

II. Opinionaire

A. Rate the following statements on a scale of 1 to 5, where 1 means you agree strongly, and 5 means you disagree strongly.

1	2	3	4	5
Agree Strongly	Agree	Neutral	Disagree	Disagree Strongly

_____1. Computers are a waste of time.

_____2. Computers cause unemployment.

_____3. Computers are easy to break.

_____4. Computers are easy for me to use.

_____5. There's never enough time for me to work on the computer.

_____6. You have to be good in Mathematics to work with a computer.

_____7. My knowledge of computers will affect my future employment.

_____8. Computers can help me learn.

B. In the space below, briefly describe how you think computers will affect your own future.

____

____

____

____

____

____

____

III. Computer Literacy

Circle the letter of the correct choice in each of the following:

1. When programming, which key must always be pressed before the computer will interpret a command?

A) ECS
B) SHIFT
C) CTRL
D) RETURN

2. The blinking light on the monitor screen in the form of a square indicates the position of the next entry. This blinking light is commonly called a:

A) BIT
B) FLASHER
C) CURSOR
D) CHIP

3. What do you do to "boot up" the computer?

A) Type PR#6
B) Turn TV on
C) Check to be sure the drive is empty
D) Push reset

4. Which of the following program lines would print HELLO on the screen?

A) `10 PRINT "HELLO"`
B) `10 PRINT HELLO`
C) `10 PRINT : HELLO`
D) `10 PRINT HELLO $`

5. Which of the following programs will print HELLO on the screen:

A) `10 A = HELLO : PRINT A$`
B) `10 A = "HELLO": PRINT A$`
C) `10 A$ = HELLO: PRINT A$`
D) `10 A$ ="HELLO":PRINT A$`

6. Which of the following programs will print HELLO on the screen:

A)
```
10 PRINT "HEL",
20 PRINT "LO"
```

B)
```
10 PRINT "HEL";
20 PRINT "LO"
```

C)
```
10 PRINT "HEL":
20 PRINT "LO"
```

D)
```
10 PRINT "HEL"
20 PRINT "LO"
```

7. Which of these programs asks the user to type in his/her name and then responds by repeating the name?

A)
```
10 PRINT "WHAT IS YOUR NAME?"
20 GIVE  N$
30 PRINT N$
```

B)
```
10 PRINT "WHAT IS YOUR NAME?"
20 INPUT N$
30 PRINT N$
```

C)
```
10 PRINT "WHAT IS YOUR NAME?"
20  ?  N$
30 PRINT N$
```

D)
```
10 PRINT "WHAT IS YOUR NAME?"
20 READ N$
30 PRINT N$
```

8. Which line will complete this program?

```
10 READ A$
20 PRINT A$
```

A) 30 GET HELLO

B) 30 INPUT HELLO

C) 30 PRINT HELLO

D) 30 DATA HELLO

9. What is the BASIC expression and answer for 13 - 4 ÷ 2(6 - 1)?

A) 13 - 4/2 (6 - 1) = 0

B) 13 - (4/2) * (6 - 1) = 0

C) 13 - 4/2 (6 - 1) = 3

D) 13 - (4/2) * (6 - 1) = 3

10. What will the following program PRINT?

```
10 PRINT "NOW IS — ";
20 REM PRINT "THE TIME — ";
30 PRINT "FOR ALL GOOD MEN."
```

A) NOW IS FOR ALL GOOD MEN:

B) NOW IS THE TIME FOR ALL GOOD MEN.

C) NOW IS THE TIMEFOR ALL GOOD MEN.

D)
```
NOW IS
THE TIME
FOR ALL GOOD MEN.
```

11. What will the following program PRINT?

```
10 PRINT "2+2=";
20 GOTO 40
30 PRINT "6"
40 PRINT "4"
```

A)
```
4    4
```

B)
```
2 + 2 =
4
```

C)
```
2 + 2 = 4
```

D)
```
4
4
```

12. What will the following program PRINT?

```
10 IF 10>6 THEN PRINT "TEN IS GREATER THAN SIX":END
20 PRINT "TEN IS LESS THAN SIX"
```

A) TEN IS LESS THAN SIX

B) TEN IS GREATER THAN SIX

C) SYNTAX ERROR

D)
```
TEN IS GREATER THAN SIX
TEN IS LESS THAN SIX
```

13. Which of the following programs will print only 30 dashes on the screen?

A) `10 PRINT " — " : GOTO 10`

B) `10 FOR I = 1 TO 30:PRINT "—"; : NEXT " — "`

C) `10 PRINT " — " * 30`

D) `10 FOR I = 1 TO 30:PRINT "—"; : NEXT I`

14. Which of the following commands sends the flow of a program from a subroutine back to the main program?

A) RESUME

B) RETURN

C) STOP

D) ESCAPE

15. The command to list items in the diskette memory is:

A) GOTO

B) LIST

C) COPY

D) CATALOG

16. Here is a list of programs on a disk.

```
A   008   RHYME TIME
A   052   SUPERMATH
I   007   HELLO
B   054   HI-RES BASEBALL
```

What would you type to get SUPERMATH to work?

A) RUN SUPERMATH

B) 052

C) RUN 52

D) BRUN SUPERMATH

17. The command which <u>stores</u> programs currently in computer memory on a disk is:

A) BACKUP

B) COPY

C) SAVE

D) PRINT

18. Which of the following programs will generate a random whole number from 1 to 100?

A) `10 PRINT  INT(101 * RND (1))`

B) `10 PRINT  RND(101 * INT (1))`

C) `10   RND   101`

D) `10   INT   101`

19. When a program is loaded from a diskette into the computer, the program is stored in:

A) Cathode Ray Tube (TV)

B) Read Only Memory (ROM)

C) Central Processing Unit (CPU)

D) Random Access Memory (RAM)

20.

```
10  GR
30  PLOT  16,20
50  END
```

The above program needs the following line to run:

A) `40  COLOR = 1`

B) `20  COLOR = 1`

C) `20  COLOR = RED`

D) `40  COLOR = RED`

In the right hand column write the output that would result when each of the following programs are executed (i.e. RUN)

Output

21.

```
10 A = A + 1
20 A = 0
30 PRINT A
40 END
```

21.

22.

```
30 X = 1
40 FOR Y = 1 TO 3
50 X = X - 1
60 NEXT Y
70 PRINT ABS (X)
80 END
```

22.

23.

```
10 A = 6:B = 8
20 C = A + B
30 IF C > 10 THEN GOTO 70
40 PRINT "OOPS!"
50 GOTO 70
60 PRINT "THE"
70 PRINT "END"
80  END
```

23.

24.

```
100 X2 = 3.495
150 Y = INT (X2*100+.5)/100
200 PRINT Y
250 END
```

24.

25.

```
 50 D = 5 + 15 -(3*2)
100 PRINT "D␣=␣"; D
150 END
```

25.

Part III
ANSWER KEY

1. D
2. C
3. A
4. A
5. D
6. B
7. B
8. D
9. D
10. A
11. C
12. B
13. D
14. A
15. D
16. A
17. C
18. A
19. D
20. B

21. 0

22. 2

23. END

24. 3.5

25. D = 14

APPENDIX C

COMPUTER INSERVICE COURSE OUTLINES

1982-83 Year

1983-84 Year

1982-83 Course Outlines

EDIS 525.01 UNIVERSITY OF CALGARY

INTRODUCTION TO BASIC PROGRAMMING

COMPUTER LITERACY I

1. Powering the Microcomputer Up and Down.
2. DOS Commands - RUN, LOAD.
3. Using Software - LOAD, LIST, CATALOG, NEW, HOME.
4. Basic Programming
   - Immediate and Delayed Mode.
   - Special Function Keys - Control-C, Reset.
   - Commands: LET, PRINT, INPUT, GOTO.

MICROCOMPUTER INSERVICE - LOGO

(Used With Groups 2 & 5)

1. Powering the Microcomputer Up and Down.
2. Commands for Running/Coyping/Saving Programs - taught throughout the course to individuals as required.
3. Underlying philosophy of LOGO language.
4. Keyboard Commands.
5. Simple procedures.
6. Defining procedures.
7. No draw mode.
8. Draw mode.
9. Edit mode.
10. Procedures with Inputs.
11. Use of REPEAT.
12. Use of Recursion - :Two Inputs.
13. Words and Lists.

MEDICINE HAT COLLEGE

PART I BASIC BASIC

I. Introductory concepts
  A. Computer Characteristics
  B. Modes of Operation
  C. Introduction to BASIC

II. BASIC
  A. Numbers (constants)
  B. Strings
  C. Variables
  D. Operators and Formulas (expressions)
  E. Hierarchy of Operations
  F. Use of Parentheses
  G. Special rules Concerning Formulas
  H. Assigning Values-LET Statement
  I. Reading Input-INPUT Statement
  J. Printing Output-PRINT Statement
  K. Writing Complete Programs in BASIC
  L. Program Comments-REM Statement
  M. Transferring Control-GOTO Statement
  N. Repetitious Program Execution

III. RUNNING A BASIC PROGRAM
  A. Timesharing Terminal
  B. Logging In
  C. Entering A Program
  D. Correcting Errors
  E. Processing a Program
  F. Logging Out

- G. Error Diagnostics
- H. Logical Debugging

IV. BRANCHING AND LOOPING

- A. Relational Operators
- B. Conditional Branching-IF-THEN
- C. Multiple Branching-ON-GOTO
- D. STOP Statement
- E. Loops-FOR-TO
- F. Closing a Loop-NEXT Statement
- G. Nested Loops

V. ADDITIONAL FEATURES of BASIC

- A. Library Functions
- B. Lists and Tables (arrays)
- C. Subscripted Variables
- D. Arrays-DIM Statement
- E. Input Data-READ-DATA Statements
- F. Rereading Data-RESTORE Statement

1983-84 Course Outlines

ADVANCED BASIC PROGRAMMING

COURSE DESCRIPTION

Are you frustrated by knowing what the computer can do but do not know which commands are needed? Learning this from manuals can be long and tedious. This course, an extension of the introductory inservice classes that were held last year, is designed to extend the participants working knowledge of BASIC. It will provide the participant with enough command of the BASIC language to develope programs that would be used in the classroom. Each participant will develop a CAI program during the inservice.

TO REGISTER PHONE LORNE COOPER AT ALEXANDRA JUNIOR HIGH SCHOOL (PHONE 527-8571). LEAVE YOUR NAME WITH THE SECRETARY.

PREREQUISITES

It is assumed that all participants have a working knowledge of the Apple II systems and the following BASIC terms:

1) I/O Commands

DATA/READ
INPUT
LET
PR#6
PRINT

2) Utility Commands

BRUN
DELETE
END
INIT
LOAD
NEW
NOTRACE*
RUN
SAVE
TRACE*

3) Editing Command

←
→
CTRL C
FLASH*
HOME
HTAB*
INVERSE*
LIST
NORMAL*
REM
SPEED*
VTAB*

4) Flow Control

FOR-NEXT
GOTO
IF-THEN

5) Algebraic Operators

=
+
-
*
/
^

6) Logical Operators

=
<
>
<>

7) LO-RES Graphics

COLOR
GR
HLIN
PLOT
VLIN

* Knowledge of * items is desireable but not manditory

DAY 4 Flow Control

Flow Charts
FOR - NEXT
GO TO
IF - THEN
TRACE/NOTRACE(as a debugging device)

DAY 5 READ/DATA Statements
Introduction to LO-RES graphics

DAY 6 LO-RES graphics continued
Completion of CAI project

INTRODUCTION TO BASIC

COURSE DESCRIPTION

This course is intended to be an introduction to the use of the microcomputer and to the BASIC language. No previous experience with computers is required. Participants will construct a program which could be used in their own class or subject area as part of CAI (Computer Assisted Instruction) program.

TO REGISTER PHONE CAM BARBOUR AT SEVEN PERSONS SCHOOL (PHONE 832-3732). LEAVE YOUR NAME WITH THE SECRETARY

COURSE OUTLINE

DAY 1 Major components of a micro system

Keyboard familiarization

Running existing software using RUN, BRUN, LOAD, PR#6

Initialization of a Diskette.

DAY 2 Introduction to Program construction using

- PRINT
- REM
- INPUT
- END
- HOME
- CATALOG
- SAVE
- DELETE
- LOCK
- UNLOCK
- NEW
- LIST
- CTRL C

Algebraic Operators =

+ - x ÷ ∧ =

Introduction to use of variables

- real
- integer
- string

Use of variables with a LET statement

DAY 3 Use of editing commands:

- FLASH
- NORMAL
- ←
- →
- INVERSE
- SPEED
- HTAB
- VTAB

ASSIGNMENTS

Each person will do their work on their own diskette which they may purchase from the instructor.

Assignments will build towards a major project which will be some form of CAI that the participant may actually use in his/her classroom. It is assumed that each participant has access to a computer in order to complete the assignments.

COURSE OUTLINE

DAY 1 Introduction

REMs and housekeeping

Title Page - FLASH;INVERSE;NORMAL;VTAB;HTAB

Menu Page

DAY 2 Polishing Title and Menu pages -
  GOSUB;POP;RETURN
  GET;VAL and editing

Idiot proofing - IF-AND-THEN;ON-GOTO;ON-GOSUB;
  ONERR GOTO;PEEK(222);RESUME;
  POKE 216,0;STOP

DAY 3 Counters

Arrays - DIM

Questions - DATA/READ;RESTORE

Strings - concatenation
  LEFT$;RIGHT$;MID$;STR$;VAL;LEN

Flow control - FOR-NEXT-STEP

DAY 4 D$=CHR$(4)-CATALOG;RUN;BRUN;BLOAD

Filing text - D$-OPEN;READ;CLOSE;APPEND;WRITE;
  MON;NOMON
  serial and random access files

DAY 5 LO-RES - Full screen graphics;SCRN

HI-RES - LOMEM;HIMEM;memory addresses;HCOLOR;HPLOT;
  DRAW;XDRAW;binary to hexadecimal conversions;
  shape table;CALL-151;binary files;machine
  language:BSAVE;BLOAD;SCALE;ROT

SOUND-CHR$(7);PEEK(-16336)

DAY 6 CALLS;PEEK;POKE

STOP;CONT

RENAME

DATA BASE MANAGERS

COURSE DESCRIPTION

Have you ever filed a document and forgotten where it was? Do you often remember that you have an article discussing a specific teaching technique but cannot remember the name of the article or where it is filed? Do you often wish you had all your materials keyed to your instructional objectives and at the same time know where you had them filed? Is record keeping a chore?

This segment offers many answers and is intended to stimulate your mind to see the possibilities for managing your data in the schools. It deals with filing, retrieving and sorting of information and offers hands on experience.

WORD PROCESSING

COURSE DESCRIPTION

Participants in this segment will learn how to make use of all of the features of a simple word-processing program to write, edit, and format various types of documents. Those who have access to or need more powerful programs and who wish to become familiar with their features will have the opportunity to do so. The many possible applications of word processing in schools will be explored, but the emphasis will be on hands-on experience.

SPREAD SHEETS (VISICALC)

COURSE DESCRIPTION

Administrators, is mini budgeting a chore? Teachers, is your grading system driving you around the bend because of the number of assignments that must count in the final grade? Testers, is looking up tables for different texts and doing calculations a chore? Purchasers, is price comparison a chore? Math and Business Edcuation teachers, are you familiar with Visicalc?

This segment is for anyone who has to deal with figures that entails a number of calculations. It is well suited to financial projections of any type.

TO REGISTER PHONE RUDI BAILEY AT MEDICINE HAT PUBLIC SCHOOL BOARD (PHONE 527-8571). LEAVE YOUR NAME WITH THE SECRETARY.

COURSE OUTLINE

DATA BASE MANAGERS

DAY 1 Introduction to Data Base Managers:

- A. What is a Data Base.
- B. What is a Data Base Manager.
- C. Some popular Data Bases and their differences.
- D. PFS (Personal Filing System): Creating a file-a guided tour.
- E. Applications - DISCUSSION.
- F. Hardware requirements.
- G. Homework: Creating your own file on PFS.

DAY 2 Individual help with applications.

Viewing Data Bases according to individual needs and interest (e.g. Datafax, DB Master, List Handles).

Hardware requirements.

WORD PROCESSING

DAY 3 Some applications of word processing will be described and discussed.

Typing skill-building programs will be demonstrated.

Printers and print quality will be demonstrated.

The Bank Street Writer will be used by each participant to produce a printed document.

Limitations of the Bank Street Writer will be examined, and features available on other programs will be described.

DAY 4 Advanced and specialized applications will be described.

The Sensible Speller spelling checker will be demonstrated.

Participants will choose one of the following options:

- A. Those who feel that the Bank Street Writer meets their needs will be given an exercise which will require them to demonstrate mastery of all of that program's features.

DAY 4 B. Supertext 40/56/70, Apple Writer, or another program of the participant's choosing will be used to produce a printed document.

SPREAD SHEETS

DAY 5 What is a Spread Sheet - VISICALC and multiplan discussed.

Applications.

VISICALC - How to use - Hands on.

Homework - Participants application.

DAY 6 More applications.

INDIVIDUAL HELP.

PROBLEM SOLVING WITH LOGO IN THE ELEMENTARY CLASSROOM

COURSE DESCRIPTION

This course is for the elementary teacher with one or more computers in the classroom. It is not about programing. Rather the course will aid the teacher in creating a problem solving environment in the elementary classroom using LOGO. It will show teachers how to use the LOGO language as a powerful classroom tool even if the teacher has only one computer available for use. Use of LOGO as a curriculum aid will also be covered.

NO EXPERIENCE WITH COMPUTERS IS NECESSARY.

TO REGISTER PHONE RAY WEST AT ST. MARY'S SCHOOL (PHONE 527-7616). LEAVE YOUR NAME WITH THE SECRETARY.

COURSE OUTLINE

DAY 1 Survey of teacher experience with computers and LOGO.

Care and use of computers/disks and equipment will be explained. This presentation will vary dependent upon the experience of those registered in the class.

Explanation of what LOGO is. This will consist of discussion of LOGO as a computer language and its capabilities. Handouts containing information and bibliographies will be given out as information/assigned reading.

Beginning with LOGO. Teachers will learn how to load LOGO if necessary.

Commands for moving the turtle around the screen will be taught as well as the use of Instant Programs.

DAY 2 Creating a LOGO environment in the classroom. Teachers will begin hands on work using LOGO to solve problems related to the elementary curriculum.

Teachers will begin to design a classroom chart containing problem solving projects using the commands which move the turtle around the screen and/or the Instant Programs.

Teachers will learn how to save pictures. As homework teachers will be asked to come up with curriculum related projects for their own classroom.

DAY 3 Teachers will be shown techniques with which students can solve problems before and while working on the computer.

Use of Big Track and Maze programs in designing turtle projects and learning turtle movement will be demonstrated.

Use of the LOGO editor and creating procedures will be demonstrated.

DAY 4 Session four will focus on creating the classroom environment where LOGO can be used to its best advantage. Teachers will be provided with a plan for setting up their classroom to establish a problem solving environment using LOGO.

Teachers will be presented with advanced problem solving projects involving the use of recursion. Teachers will be asked to design their own recursion projects as homework.

DAY 5 Use of LOGO for areas other than turtle graphics will be demonstrated.

Specifically teachers will learn the use of LOGO in the Language Arts area.

This may include creating lists and constructing sentences from random lists of nouns, verbs, adjectives, etc.

Teachers will learn how to use the LOGO text editor and to print out text as well as procedures.

If time permits LOGO music will be demonstrated.

DAY 6 This session will deal with use of the LOGO utilities disk.

Teachers will be asked to bring to this class student work on a project that the teacher has designed for their classroom and grade level. At this point teachers should be able to work with LOGO in the classroom and will be asked to share their ideas on what is working and what is not.

Time permitting changing the shape of the turtle will be demonstrated and teachers will be given a brief look at the Terrapin tutorial manual. If teachers request, advanced commands and programming may be taught/demonstrated.

APPENDIX D

INSTRUMENTS

1982-83 Portion of Study

1983-84 Portion of Study

1984 Follow-up Survey

1982-83 Instruments

Part I
Background Information

Questionnaire for the

The Medicine Hat and District
Computer Consortium
Research Project

October 15, 1982

Questionnaire No. ______

Part I Background Information Section. Please circle your response.

1. My present teaching responsibilities are at the:

   (a) elementary level.
   (b) junior high level.
   (c) senior high level.
   (d) both elementary and junior high levels.
   (e) both junior and senior high levels.

2. My present subject-area responsibilities are as follows:

   (a) three or more different subjects.
   (b) more than one half-time in mathematics.
   (c) mainly science courses (more than one half-time in science).
   (d) Social Science (more than one half-time in social science).
   (e) more than half-time in the arts).
   (f) more than half-time in "languages".
   (g) other ________________________.

3. My administrative responsibilities are:

   (a) none presently.
   (b) principal of a school.
   (c) vice-principal.
   (d) department head.
   (e) Central Office.

4. How many years of in-school teaching and/or administrative experience have you had?

   (a) two years or less.
   (b) from 2 to 5 years.
   (c) from 6 to 10 years.
   (d) from 11 to 15 years.
   (e) more than 15 years.

5. Your orientation to microcomputers has been:

   (a) none until now.
   (b) one previous course.
   (c) more than one course.
   (d) conference attendance only.
   (e) personal reading or informal experience.

6. Rate the following statements on how closely they describe how you felt about computers before you started this orientation session. (1-most accurately describes your feelings, 5-least accurately describes your feelings.)

_______ I had a fear of computers.

_______ I had a strong liking for the abstract-technical aspect of computers.

_______ I lacked confidence in my ability to handle computers.

_______ I wanted to see how computers could be used in my profession.

_______ I had negative feelings about impersonal nature of computers.

7. List as many uses as you can for the utilization of computers in your present teaching and or administrative assignment:

____

____

____

____

____

8. Do you foresee any limitations or problems in utilizing microcomputers in schools. If so, please list these concerns.

____

____

____

____

____

Part II

Opionaire for the
Medicine Hat and District
Computer Consortium

October 15, 1982

Opionaire No. ___________

Part II

1. Funds that are currently available for computer software (programs, disks, etc.) should be spent as follows. (Rate-1 high priority to 5-low priority.)

    _____ for administrative programs that compile and report student marks and keep attendance.

    _____ for commercially available programs that can be used for skill development (spelling), motivation (games), and enrichment (logic).

    _____ programs that teach skills and monitor student progress.

    _____ print (books) and program (disk) resources that inform users about computers (history, society, etc.)

    _____ classroom materials that will emphasize student operating and programming skills on the computer.

2. Rate the following in terms of budget priorities that you think should apply over the next two years in your school.

    _____ Second language programs.

    _____ Fine Arts programs (e.g. Choral).

    _____ Computer technology.

    _____ Work experience programs.

3. If you were allocated one computer in your classroom for three hours per week, how would you make use of it? (Rate 1-highest priority to 7-lowest priority.)

    _____ Use it to develop your personal expertise so that you can in turn work with students.

    _____ Divide the time up among students so that they can interact with commercially available instructional and enrichment programs.

    _____ To teach students computer programming at an appropriate level.

    _____ Operate a computer club where interested students could explore and extend their skills on the computer.

    _____ Use the computer to remediate skill efficiencies with individual students and manage student learning.

    _____ Give your computer time to another class until more definite directions for computer use become available.

    _____ Use the computer to do most of the administrative tasks that take your time (marks, attendance, etc.)

4. Rate the following types of computer programs in terms of their usefulness to your classroom and/or administrative assignments. (Rate 1-most useful to 5-least useful.)

_____ CEL-Computer Enhanced Learning (Simulations, challenges, games and demonstrations.)

_____ CLS-Computer Language Systems (operating computer and programming in Basic or LOGO.)

_____ CAI-Computer Assisted Instruction (skills and enrichment-straight run programs.)

_____ APC-Administrative Programs on Computer.

_____ CMI-Computer Managed Instruction (achievement monitoring and tracking.)

5. In what order of importance would you list the following uses of the microcomputer. (Rate 1-most important to 5-least important.)

_____ Assist with instructional skills using commercially available programs.

_____ Assist with administrative details of the classroom (attendance, report cards, marks).

_____ Manage student's learning of skills (e.g. spelling, computation).

_____ Use of commercial programs for student interest and enrichment (e.g. games).

_____ Instruction of teachers and students in the operation and programming of computers.

6. If two hours per week were to be allocated to only one of the following program expansions, to which of the following would you give priority. (Rate 1-highest priority to 4-lowest priority.)

_____ Career and Vocational Training.

_____ Computer training.

_____ Core subject (language, science, mathematics).

_____ French Immersion.

Part III

Computer Literacy

Questionnaire for the
Medicine Hat and District
Computer Consortium
Research Project

October 15, 1982

Questionnaire No. ________

Part III

1. Before a diskette with the Disk II drive can be used for the first time, it must be:

   (a) BOOTED
   (b) INITIALIZED
   (c) WRITE PROTECTED
   (d) CLEANED

2. In order for the Apple II to recognize any disk command the special Disk Operating System program (DOS) must be in computer memory. The process of reading a copy of DOS from a disk and placing it in memory is:

   (a) CATALOG
   (b) BOOT
   (c) COPY
   (d) REPEAT

3. The command to list items in the diskette memory is:

   (a) CATALOG
   (b) LIST
   (c) COPY
   (d) GO TO

4. The member of bytes represented by each "K" of memory is:

   (a) 1000
   (b) 1024
   (c) 64
   (d) 48

5. Computer memory is measured in units called:

   (a) ROM
   (b) CHIPS
   (c) BYTES
   (d) RAM

6. The command which stores programs currently in computer memory on a disk is:

   (a) COPY
   (b) SAVE
   (c) BACKUP
   (d) PRINT

7. A computer is unable to function automatically unless it receives explicit instructions. This series of instructions is called a:

   (a) PROGRAM
   (b) LIST
   (c) DISK
   (d) LANGUAGE

8. All the electrical and mechanical parts that make up a computer system are called:

(a) SOFTWARE
(b) HARDWARE
(c) MICROCHIPS
(d) COMPUTER LANGUAGES

9. The part of a computing system that contains the circuits that control and perform the execution of instructions is the:

(a) DISK DRIVE
(b) CENTRAL PROCESSING UNIT
(c) PRINTER
(d) MONITOR

10. The "permanent" memory (whose contents never change, even when the power is turned off) which contains the programs which enables us to understand and respond appropriately to typed commands is called:

(a) ROM
(b) RAM
(c) CPU
(d) DOS

11. The "temporary" memory (which works only as long as the power remains on) which determines what task the computer is currently applied to is called:

(a) ROM
(b) RAM
(c) CPU
(d) DOS

12. The command to read a program file from a disk into computer memory is called:

(a) RUN
(b) LOAD
(c) SAVE
(d) PRINT

13. The command that executes the program currently in the computer memory is:

(a) RUN
(b) PRINT
(c) LIST
(d) DEFINE

14. The blinking light on the monitor screen in the form of a square indicates the position of the next entry. This blinking light is called a:

(a) TURTLE
(b) CURSOR
(c) BIT
(d) CHIP

15. When programming, which key must always be pressed before the computer will interpret a command?

(a) SHIFT
(b) RETURN
(c) CTRL
(d) ESC

16. Which command must be typed in order to display a program currently stored in computer memory on the monitor screen?

(a) LIST
(b) READ
(c) PRINT
(d) RUN

17. Which of the following is NOT a keyboard command?

(a) RETURN
(b) ESCAPE
(c) CTRL "C"
(d) READY

18. CAI refers to an educational concept whereby a computer system is used to:

(a) keep student records.
(b) assist in the instruction of students.
(c) have students develop programs on their own.
(d) generate educational software.

19. Which one of the following is NOT a computer language:

(a) Logo
(b) Basic
(c) Pet
(d) Pascal

20. Where do you think the Computer Technology Branch of Alberta Education should concentrate its efforts for the next two years. Rate 1-highest priority to 5-lowest priority.

_____ Purchase and develop programs involving high level thinking skills (e.g. process, problem solving, comprehension, etc.).

_____ Purchase and distribute commercially available programs that focus on subject area skills, remediation and enrichment.

_____ Development of curriculum materials that equip teachers and students to function with computers.

_____ School and System inservice on the operation and application of computers in educational environments.

_____ Policy and information sharing (e.g. hardware and software news and updates).

1983-84 Instruments

QUESTIONNAIRE FOR THE MEDICINE HAT AND DISTRICT COMPUTER CONSORTIUM RESEARCH PROJECT

NAME OF RESPONDENT ____________________ COURSE ALL COURSES

PART I - BACKGROUND INFORMATION

____ 1. My experience with microcomputers has been:

(a) none until now
(b) one previous course
(c) more than one previous course
(d) conference attendance only
(e) personal reading or informal experience

____ 2. My teaching experience to the fall of 1983 has been:

(a) 0 - 2
(b) 3 - 5
(c) 6 - 10
(d) more than 10

____ 3. I would describe my attitude toward the use of microcomputers in schools as:

(a) positive
(b) undecided
(c) negative

4. List as many general applications as you can for microcomputers in classrooms. Identify each application with a letter, starting with a.

a. ____________________

____

____

____

____

5. Which applications listed in question 3 would you actually use in your classroom or school if you had the necessary equipment and materials? (Refer to them by the letters a, b, c, etc. you used in question 3)

____

____

____

____

____

PART II - COMPUTER FUNCTIONAL FOR ALL COURSES

____ 1. All the electrical and mechanical parts that make up a computer system are called:

(a) SOFTWARE
(b) HARDWARE
(c) MICROCHIPS
(d) COMPUTER LANGUAGES

____ 2. A computer is unable to function automatically unless it receives explicit instructions. This series of instructions is called a:

(a) PROGRAM
(b) LIST
(c) DISK
(d) LANGUAGE

____ 3. Before a diskette with the Disk II drive can be used for the first time, it must be:

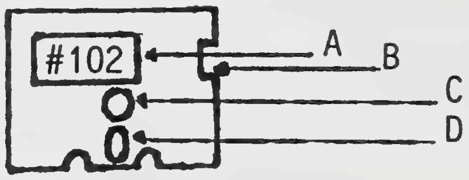
(a) BOOTED
(b) INITIALIZED
(c) WRITE PROTECTED
(d) CLEANED

____ 4. In order for the Apple II to recognize any disk command the special Disk Operating System program (DOS) must be in computer memory. The process of reading a copy of DOS from a disk and placing it in memory is:

(a) CATALOG
(b) BOOT
(c) COPY
(d) REPEAT

____ 5. Here is a disk. Where would you ruin the disk if you touched it?

(a) at A
(b) at B
(c) at C
(d) at D



PART III - COMPUTER LITERACY

INTRODUCTION TO BASIC

Circle the letter of the correct choice in each of the following:

1. When programming, which key must always be pressed before the computer will interpret a command?

A) ECS
B) SHIFT
C) CTRL
[✓ D)] RETURN

2. The blinking light on the monitor screen in the form of a square indicates the position of the next entry. This blinking light is commonly called a:

A) BIT
B) FLASHER
[✓ C)] CURSOR
D) CHIP

3. What do you do to "boot up" the computer?

A) Type PR#6
[✓ B)] Turn TV on
C) Check to be sure the drive is empty
D) Push reset

4. Which of the following program lines would print HELLO on the screen?

A) `10 PRINT "HELLO"`
B) `10 PRINT HELLO`
[✓ C)] `10 PRINT : HELLO`
D) `10 PRINT HELLO $`

5. Which of the following commands sends the flow of a program from a subroutine back to the main program?

A) RESUME
[✓ B)] RETURN
C) STOP
D) ESCAPE

6. The command to list items in the diskette memory is:

A) GOTO
B) LIST
C) COPY
[✓ D)] CATALOG

7. Here is a list of programs on a disk.

```
A  008  RHYME TIME
A  052  SUPERMATH
I  007  HELLO
B  054  HI-RES BASEBALL
```

What would you type to get SUPERMATH to work?

[✓ A)] RUN SUPERMATH
B) 052
C) RUN 52
D) BRUN SUPERMATH

8. The command which <u>stores</u> programs currently in computer memory on a disk is:

A) BACKUP
[✓ B)] COPY
C) SAVE
D) PRINT

9. When a program is loaded from a diskette into the computer, the program is stored in:

A) Cathode Ray Tube (TV)

B) Read Only Memory (ROM)

C) Central Processing Unit (CPU)

[✓ D)] Random Access Memory (RAM)

10.

```
10  GR
30  PLOT  16,20
50  END
```

The above program needs the following line to run:

A) 40 COLOR = 1

B) 20 COLOR = 1

C) 20 COLOR = RED

D) 40 COLOR = RED

11. Which of these programs askes the user to type in his/her name and then responds by repeating the name?

A)

```
10 PRINT "WHAT IS YOUR NAME?"
20 GIVE N$
30 PRINT N$
```

B)

```
10 PRINT "WHAT IS YOUR NAME?"
20 INPUT N$
30 PRINT N$
```

C)

```
10 PRINT "WHAT IS YOUR NAME?"
20  ? N$
30 PRINT N$
```

D)

```
10 PRINT "WHAT IS YOUR NAME?"
20 READ N$
30 PRINT N$
```

12. What is the BASIC expression and answer for 13 - 4 ÷ 2(6 - 1)?

A) 13 - 4/2 (6 - 1) = 0

B) 13 - (4/2) * (6 - 1) = 0

C) 13 - 4/2 (6 - 1) = 3

D) 13 - (4/2) * (6 - 1) = 3

13. What will the following program PRINT?

```
10 PRINT "2+2=";
20 GOTO 40
30 PRINT "6"
40 PRINT "4"
```

A)
```
4    4
```

B)
```
2 + 2 =
4
```

C)
```
2 + 2 = 4
```

D)
```
4
4
```

14. *What will the following program PRINT?*

```
10 IF 10 > 6 THEN PRINT "TEN IS GREATER THAN SIX":END
20 PRINT "TEN IS LESS THAN SIX"
```

[✓ A)] TEN IS LESS THAN SIX

B) TEN IS GREATER THAN SIX

C) SYNTAX ERROR

D) TEN IS GREATER THAN SIX
TEN IS LESS THAN SIX

15. *Which line will complete this program?*

```
10 READ A$
20 PRINT A$
```

A) 30 GET HELLO

[✓ B)] 30 INPUT HELLO

C) 30 PRINT HELLO

D) 30 DATA HELLO

PART III - ADVANCED BASIC

____ 1. CAI refers to an educational concept whereby a computer system is used to:

(a) keep student records
(b) assist in the instruction of students
(c) have students develop programs on their own
(d) generate educational software

____ 2. What will the following program PRINT?

```
10 PRINT "NOW IS ";
20 REM PRINT "THE TIME ";
30 PRINT "FOR ALL GOOD MEN."
```

(a) NOW IS THE TIME FOR ALL GOOD MEN
(b) NOW IS
THE TIME
FOR ALL GOOD MEN.
(c) NOW IS
FOR ALL GOOD MEN
(d) NOW IS FOR ALL GOOD MEN

____ 3.

```
  30 INPUT"WHAT'S YOUR NAME";N$
  40 GOTO SUB1000
  50 PRINT "HELLO␣";N$
  60 END
1000 REM... TIME DELAY
1010 FOR T=1 TO 1500:NEXT T
1020 RETURN
```

Which of the following changes would debug the above program?

(a) 1020 GOTO 50
(b) 1030 END
(c) 40 GOTO 1000
(d) 40 GOSUB 1000

____ 4. Which of the following statements in a subroutine would turn off the RETURN flag?

(a) STOP
(b) RESUME
(c) POP
(d) GOSUB

____ 5. What will be the result when the following program is RUN?

```
10 A$ = "FRED"
20 B$ = "   "
30 C$ = "&"
40 D$ = "MARY"
50 E$ = A$ + B$ + C$ + B$ + D$
60 PRINT E$
```

(a) A$ + B$ + C$ + B$ + D$
(b) FRED&MARY
(c) FRED & MARY
(d) E$

____ 6. Which of the following statements is correct?
(The ASCII code for A is 65)

```
(a)  VAL(A$)=CHR$(65)
(b)  CHR$(A)=STR$(A)
(c)  ASC("A")=CHR$(65)
(d)  VAL(A$)=STR$(A)
```

____ 7. Which statement turns off the ONERR flag?

(a) PEEK(222)
(b) RETURN
(c) CONT
(d) RESUME

____ 8.

```
20 A$="ALEX"
30 FOR X=1 TO 4
40 B$=LEFT$(A$,X)
50 PRINT B$
60 NEXT X
```

The output of the above program would look like:

```
(a)  A                              (c)  X
     AL                                  EX
     ALE                                 LEX
     ALEX                                ALEX
(b)  A                              (d)  E
     L                                   LE
     E                                   LEX
     X                                   ALEX
```

____ 9.

```
10 DIM A$(100),A(100,10)
```

How many variables have been dimensioned with the above program line?

(a) 100
(b) 210
(c) 1000
(d) 1100

____ 10.

```
20 FOR M=1 TO 10
30 FOR N=1 TO 20
40 READ (M,N)
50 NEXT M
60 NEXT N
70 END
```

Which of the following changes would bebug the above program?

```
(a)  50 NEXT N
     60 NEXT M
(b)  50 NEXT M:NEXT N
     60
(c)  20 FOR M=1 TO 10:FOR N=1 TO 20
     30
(d)  40 READ (N,M)
```

____ 11.

```
20 D$=CHR$(4):RE, CTRL-D
30 INPUT "YOUR NAME␣";N$
40 PRINT D$;"RUN HELLO"
```

If the above program is run and a list of the HELLO program on the disk is:

```
10REM---HELLO
20HOME
30PRINT"HELLO␣";N$
40END
```

which of the following displays would appear on the CRT?

(a)

(b)

```
HELLO
0
```

(c)

```
HELLO
```

(d)

```
HELLO
your name
```

____ 12. Before you finish working with a text file it must be:

(a) opened
(b) closed
(c) appended
(d) written to

____ 13. A text file, called MARKS, contains the following data:

```
DICK
35
57
SALLY
21
18
```

What is the output of the following program?

```
10 D$=CHR$(4):REM CTRL-D
20 ?D$;"OPEN MARKS"
30 ?D$;"POSITION MARKS,R2"
40 ?INPUT B$
50 ?D$;"CLOSE MARKS"
60 ?B$
70 END
```

(a) 35
(b) 57
(c) DICK
(d) SALLY

____ 14. Which of the following is the major advantage of using POKE statements to control the video display?

(a) It is quicker to program graphics using POKE statements
(b) The screen display can be created before showing it to the user
(c) You can easily flip from full graphics to mixed to text/graphics display
(d) You can easily flip from LO-RES to HI-RES graphics

____ 15.

```
6000:01 00 04 00
6004:25 37 00
```

The above program has been entered from the monitor. Which of the following would be the correct syntax to save this program in disk?

(a) BSAVE SQUARE,A$6000,L4,A$6004,L3
(b) BSAVE SQUARE,A6000,L7
(c) BSAVE SQUARE,A24567,L7
(d) BSAVE SQUARE;A24567,L$7

PART III - LOGO

____ 1. The LOGO language is loaded into:

(a) the disk drive
(b) Random Access Memory
(c) Read Only Memory
(d) a microchip

____ 2. Because LOGO can manipulate lists you can create procedures which:

(a) quiz
(b) teach
(c) learn
(d) all of the above

____ 3. LOGO programs are written in:

(a) the edit mode
(b) outside the editor
(c) independent of the editor
(d) both b & c

____ 4. FPUT and LPUT are examples of:

(a) LOGO primitives
(b) list processing primitives
(c) graphics primitives
(d) arithmetic primitives

____ 5. A command is best defined as:

(a) an instruction to the computer
(b) a word or line of words the computer understands
(c) a computer order
(d) an instruction part of a computer language

____ 6. LOGO is considered a high level language because:

(a) it has a large number of commands compared to other languages
(b) its commands are in "English" and are very powerful
(c) it is capable of processing and manipulating lists of words and numbers
(d) all of the above

____ 7. LOGO is considered a valuable educational tool because of its:

(a) ease of use
(b) flexibility in problem solving
(c) high level commands
(d) simplicity

____ 8. A procedure is best defined as:

(a) a program
(b) a "building block" in a program
(c) a set of instructions
(d) a line of programming

____ 9. Procedures aid learning because they can be used:

(a) to build better programs
(b) inside other procedures building on previous experience
(c) in complex programs
(d) so easily by children

____ 10. A procedure that doesn't know when to stop is described as:

(a) a redundant procedure
(b) infinite
(c) recursive
(d) a repetitive procedure

____ 11. Which procedure could notuse a number as a variable?

(a)
```
SPEAK:X
  PRINT:X
  END
```
(b)
```
SPEAK:X
  PRINT:X
SPEAK:X
  END
```
(c)
```
SPEAK:X
  PRINT:X/0
  END
```
(d) none of the above

____ 12. Which command is not a command that could be used with a turtle graphics procedure?

(a) Random
(b) Repeat
(c) FPUT
(d) FS

____ 13. Proceduresare defined using:

(a) Control<C>
(b) Control<G>
(c) Control<Y>
(d) Control<D>

____ 14. Text is defined in the LOGO text editor using:

(a) Control<C>
(b) Control<G>
(c) Control

____ 15. Because LOGO is a high level language it is valuable in education because:

(a) it is used friendly
(b) it will do more problem-solving
(c) it is better to learn than BASIC
(d) it allows for more creativity in problem solving

PART III - DATA BASE

____ 1. The Personal Filing System (PFS) can be best described as:

(a) Filing by folders
(b) Filing by forms
(c) Filing by key words
(d) Card filing

____ 2. The key used by PFS to proceed with the selected function is:

(a) Return
(b) →
(c) CTRL-C
(d) CTRL-N

____ 3. One of the main disadvantages with the PFS is:

(a) There is no way to specify what type of information should be entered into each item
(b) It will only search by primary field
(c) It will only print the design format
(d) Everything must be spelled exactly for it to search for a record

____ 4. The three most important concepts in data base management organization is:

(a) editor, sorter, retriever
(b) edit, save, print
(c) file, report, data
(d) file, field, record

____ 5. In printing a record from a data base most problems arise with the program not matched with:

(a) the printer
(b) the interface
(c) the printer/computer combination
(d) the interface/printer combination

PART IV - WORD PROCESSING

____ 1. Which of these is the least suitable application for word processing:

(a) typing a report with columns, subheadings, or other special formats
(b) producing a resume which is attractive and error-free
(c) updating a document frequently
(d) filling in forms

____ 2. To type a "control" character you:

(a) type the "escape" key first
(b) hold the shift key down and type the character
(c) hold the control key down and type the character
(d) type the control key first, then type the character

____ 3. A "cursor" is a special character which is used:

(a) to measure the amount of space which is in a file
(b) to show a carriage return or line feed
(c) to speed text entry by showing each character as it is typed
(d) to show location within a document when adding or editing text

____ 4. To move a sizeable segment of your text from one place in the document to another you would:

(a) mark the segment as a block, then insert it where you want it to go
(b) save the segment on the disk as a separate file, then reload it to the correct location
(c) use global search and replace
(d) delete the segment, then retype it where you want it

____ 5. Which of the following mistakes would be the most difficult to remedy?

(a) to use the wrong margin settings when typing the document
(b) to erase or overwrite a file on the disk
(c) to provide the wrong print commands before printing
(d) to misspell a name or other key word consistently throughout the document

PART V - SPREAD SHEET

____ 1. The main advantage of using a spread sheet program for calculations is:

(a) its ability to do projections
(b) its memory
(c) its "windows" for viewing different parts of the sheets
(d) its ability to do large calculations

____ 2. The VISICALC program command key is:

(a) CTRL-C
(b) Return
(c) /
(d) >

____ 3. The command "Blank" in VISICALC directs the program to:

(a) erase the highlighted position
(b) erase the entire sheet
(c) erase all entries in a row
(d) erase all entries in a column

____ 4. The VISICALC command that sets column width is the:

(a) Window command (W)
(b) Format command (F)
(c) Edit command (E)
(d) Global command (G)

____ 5. When VISICALC is in the edit mode ESC will:

(a) put the program back into entry mode
(b) delete characters
(c) move edit cue without changing entry
(d) insert a specified character

1984 Follow-up Survey

1984 FOLLOW-UP SURVEY OF INSERVICE PARTICIPANTS OF COURSES OFFERED BY MEDICINE HAT AND DISTRICT COMPUTER CONSORTIUM

Please do not complete this questionnaire if you only took the courses offered in the Medicine Hat (Rural) School Division No. 4 Office conducted by K. Sharman between February and April, 1982.

Please check the appropriate blanks below:

I. The courses that I took that were offered by the Medicine Hat and District Computer Consortium were:

1. --- Sept/Oct 1982 Medicine Hat School District Board Office- K. Sharman- LOGO
2. --- Nov/Dec 1982 McCoy High School- K. Sharman- LOGO
3. --- Oct/Nov 1982 Medicine Hat High School- K. Sharman- LOGO
4. --- Oct/Nov 1982 Medicine Hat High School- R. Hilles (University of Calgary) Program offered during the day- BASIC
5. --- Jan/Mar 1983 Alexandra Junior High- G. Russel- BASIC
6. --- February 1982 McCoy High School- K. Sharman- LOGO
7. --- Mar/May 1983 Alexandra Junior High- L. Sorensen- BASIC
8. --- Oct/Dec 1983 McCoy High School- C. Barbour- BASIC
9. --- Oct/Dec 1983 Alexandra Junior High- L. Cooper- Advanced Basic
10. --- Oct/Dec 1983 McCoy High School- M. Roberts- Authoring Systems
11. --- Oct/Dec 1983 Mc Coy High school- R. Bailey & D. Bahnmiller- Data Base Managers, Word Processing, Spread Sheet
12. --- Oct/Dec Alexandra Junior High- R. West & J. Letourneau- LOGO

II. My school jurisdiction is:

1. --- Medicine Hat School District #76
2. --- Medicine Hat School Division #4
3. --- Redcliff School District #2283
4. --- Ralston School District #4981
5. --- Medicine Hat Catholic School District #21

III. My teaching or other assignment in 1983-84 is:
1. --- primary grades (1-3)
2. --- upper elementary grades (4-6)
3. --- junior high (7-9)
4. --- senior high (10-12)
5. --- other (specify) -------------

IV. Number of years of teaching experience to June 30, 1984 will be:

1. --- 0 to 2
2. --- 3 to 5
3. --- 6 to 10
4. --- more than 10

V. My experience with microcomputers before taking the course(s) indicated in Question I was:

1. --- none
2. --- one previous non-credit course
3. --- more than oen previous non-credit course
4. --- one previous university credit course
5. --- more than one previous university credit course
6. --- workshop(s) only
7. --- personal reading or informal experience

VI. The number of hours of formal in-class inservice instruction needed to learn the parts of the microcomputer (disk drive, monitor, central processing unit), how to initialize and copy disks, how to run existing programs, and how to use simple keyboard commands such as RETURN, LOAD, SAVE, CATALOG, LIST and REPEAT is:

1. --- less than 2 hours
2. --- 2 to 4 hours
3. --- 4 to 6 hours
4. --- 6 to 8 hours
5. --- 8 to 10 hours
6. --- 10 to 12 hours
7. --- 12 to 14 hours
8. --- other (specify) ---------------

VII. The number of hours of formal, in-class inservice instruction needed to develop a working knowledge of the things listed in question VI above plus how to write programs in either BASIC or LOGO is:

1. --- less than 18 hours
2. --- 19 to 21 hours
3. --- 22 to 25 hours
4. --- 26 to 29 hours
5. --- other (specify) -----------------

VIII. The best length for each inservice session is:

1. --- less than an hour
2. --- 1 to 2 hours
3. --- 2 to 3 hours
4. --- other (specify) -----------------

IX. The total number of hours I spent on my own, apart from the actual inservice sessions, learning to use the microcomputer was:

1. --- 0
2. --- 1 to 5 hours
3. --- 5 to 10 hours
4. --- 10 to 15 hours
5. --- 15 to 20 hours
6. --- more than 20 hours

X. For the purpose of inservice of teachers on microcomputers, what do you consider the maximum workable ratio of participants to instructor?

1. --- 10 people to 1 instructor
2. --- 15 people to 1 instructor
3. --- 20 people to one instructor
4. --- 25 people to one instructor
5. --- Other (specify)

XI. For the purpose of inservice of teachers, what do you consider the maximum workable ratio of people to microcomputers?

1. --- 1 person to 1 microcomputer
2. --- 2 people to 1 microcomputer
3. --- 3 people to 1 microcomputer
4. --- 4 people to 1 microcomputer
5. --- Other

XII. The most effective way to organize a group for instruction is to:

1. --- Start all participants at the same place in the program and have them move through it at the same rate. The instructor would present the information and provide individual help as needed.
2. --- Put participants in small groups according to previous training and have each small group move through the program at a different rate. The instructor would present new material to each group individually.
3. --- Provide each participant with a step-by-step self-teaching guide to go through at their own rate. The instructor would be available for individual help as need.
4. --- A combination of 2 and 3 above.
5. --- Other (specify) ------------------

XIII. If you started one or more of the courses, but dropped out before it was finished, please check ( ) the reason or reasons why you dropped out.

1. --- Time conflict with other activities
2. --- Lack of access to microcomputers for practice between sessions
3. --- Could not keep up with the pace of instruction
4. --- Lack of clarity by the instructor
5. --- Insufficient individual help when it was needed
6. --- Usefulness of course contents was questionable
7. --- Other (specify) ------------------

XIV. Why did you enroll in the courses you took? (Please number each separate reason 1, 2, 3, etc.)

XV. Which before and after sequence below best describes your attitude toward the use of microcomputers in schools before you took the course(s) identified in the first question on this questionnaire and after you completed the course(s)?

	Before	After
1. ----	negative	negative
2. ----	negative	undecided
3. ----	negative	positive
4. ----	undecided	undecided
5. ----	positive	negative
6. ----	positive	undecided
7. ----	positive	positive
8. ----	undecided	positive
9. ----	undecided	negative

Complete questions XVI-XVII only if you have taught one or more of the computer literacy units prepared by Alberta Education

XVI. I have taught the following Alberta Education Computer Units during the 1983-84 school year.

1. --- Elementary Computer Literacy Unit
2. --- Junior High Computer Literacy Unit
3. --- Computer Literacy 10
4. --- Computer Literacy 10X
5. --- Computer Processing 10 (Business Ed.)
6. --- Computer Processing 20 (Business Ed.)
7. --- Computer Processing 30 (Business Ed.)

XVII. In your opinion, how useful was/were the inservice courses you took in preparing you to teach unit(s) checked in Question XVI

1. --- Very useful
2. --- Useful
3. --- Of limited use
4. --- Of no use

XVIII. General comments on how microcomputer inservice sessions might be improved.

N.L.C. - B.N.C.
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